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Use of Flocks in the Rubber Industry

Improvements in the Manufacture of Flock, Now Largely Produced for Specific Purposes, Has Given That Material a New Definition

By M. A. Foley*

1. Cotton Flock as a Filler

FLOCKS were essentially waste recovered from scouring, fulling and shearing in the wool recovery system. They were short waste fibres recovered in several of the manufacturing procedures through which fabric must pass in the finishing operation. Roughly, they were divided into two classes: Those resulting from scouring, fulling, raising, brushing and shearing of woolen and worsted fabrics, and those resulting from rag grinding and tearing in the preparation of reclaimed wool.

The definition of flocks, however, has changed in recent years, and it has come to mean a cut fibre, not necessarily wool as in the past, but cotton, rayon and miscellaneous fibres as well. The new type of flocks is distinguished particularly from the old in that it is manufactured for a definite purpose as a cut fibre in the rubber and plastics and other industries.

The best flock is cut, not ground, and when manufactured under careful laboratory and production control cannot be compared with the cotton dust with which most of the older men of the industry were familiar several years back. It is usually produced from carefully selected waste material from which all metallic contamination is removed by means of specially constructed separators. Sometimes it is scoured to produce a soft stock which has special applications.

Various styles can be produced by skillful blending of the different raw materials which the flock manufacturer has available. It is possible to vary the qualities of the finished product as to bulking, siftability, dispersion in various mediums and dye absorption. Cutting determines the length of the flock, and the length in turn has a definite relationship to the strength of the flock-filled product. Reports have indicated that the longer the fibre, consistent with good dispersion, the stronger the cured finished material.

Cotton holds the front rank in filler flock due to its low cost, but special applications have been found where rayon or wool is advisable. Ramie, hemp and

* Sales Manager, Rayon Processing Co. of R. I., Central Falls, R. I. A subsequent issue will carry an article on "Flock as a Surface Coating", by the same author.

sisal have also been experimented with, and while the rubber industry has not as yet produced stocks filled with these types of fibres it is very possible that they have a definite purpose in certain special stocks.

With regard to the use of flock as a filler in the rubber industry, the following possibilities can be mentioned:

Proofed Goods: (1) Artificial Leather—use of a good dispersing style, in the percentage of 20-30 on the rubber content, produces a leathery tough stock which furnishes excellent resistance to abrasion. (2) Luggage or Bag Stocks—use of a good dispersing type with long length, in the percentage of 30-40 on the rubber content, produces a tough stock with excellent resistance to tear. (3) Light Weight Coated Fabrics (as baby carriage material or leatherette)—use of a white stock, with good dispersing and high bulking qualities, in the percentage of 10-15 on the rubber content, produces a stock with good feel, and acts as a good base for lacquer top coat.

Sponge Products: Flock in sponge definitely aids uniform blow in fine pored work. Very satisfactory results have been obtained in practically every instance where quantities of 10% on the rubber content have been used. A proposed formula is:

Rolled Brown	50.
Flock	5.
Zinc Oxide	2.5
Stearic Acid	.5
Sodium Bicarbonate	6.
Monex	.25
Whiting	12.5
Ground Sponge	30.
Flectol H	.125
Carbon Black	3.
Litharge	.05
Sulfur	2.
Petrolatum	10.
	121.925

Cure: 7 minutes at 80 lbs.; Blow: 100%

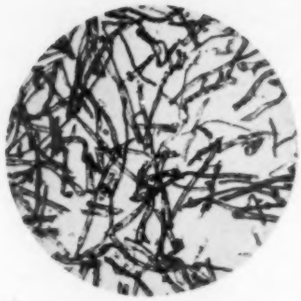
Hard Rubber Goods: Obtaining a hard rubber stock which will satisfactorily compete with synthetics is not an easy problem, but the use of flock will definitely aid in securing a stock with high strength and good finishing properties. A proposed formula is:

Smoked Sheets	25.
Flock	40.
Gray Tube Reclaim	20.
Zinc Oxide	4.
Lime	12.
Sulfur	15.
Paraffin Oil	4.
Heptene Base	.1
	120.1

Cure: 1 hour and 30 minutes at 80 lbs.

Rubber Soles and Footwear: Filler flock has been used in rubber soles and footwear for years. A good dispersing cotton is the standard type. However, good results have been obtained with wool fibres. Abrasion resistance is the factor most desired in this use, but there have been occasions where a suede appearance was taken into consideration. It is important in this stock, as it is in other types, that the flock break up in compounding so that the cured material will not show clotting throughout the piece.

Sound Deadening Cements: In this case the purpose of the flock is to furnish a tough, dry finish which will have the characteristic of "smoothing out" sound waves. It is usually supplied in short cuts, so that good spraying cements can be obtained.



Cross-section of cotton flock taken under a microscope and enlarged 40 diameters. The best flock is cut, not ground.

Mechanical Goods: At present flock is not used in any appreciable volume in mechanical goods stocks, but it is quite possible that higher resistance to abrasion and impact in this class of products could be obtained with a long flock, due to its fibrous properties.

Flock cannot be compared to leather dust, asbestos, wood flour, or other fillers on the basis of low cost, but the results of increased strength, better abrasion resistance and uniformity of product obtained with its use would indicate that it warrants a trial by manufacturers of many types of rubber products.

Suprax—Rubber-Wax Compound

THE prevention of corrosion on pipes and cables is a problem which has the constant attention of engineers and technicians. The application of Suprax, a rubber wax compound developed by Messrs. Clough (Croydon), Ltd., of England, is said to be effective in preventing corrosion. Suprax consists of rubber mixed with non-corrosive waxes and fillers, worked together into a homogeneous mass. It can be extruded on to pipes and cables, having no seams or joints of any nature, and despite the fact that it has a rubber base no vulcanization is necessary as the mixture contains no sulfur which, under electrolytic action in a damp or corrosive situation, itself becomes a corrosive agent.

Tests determined on ring test pieces of 4 mm. square section indicate that Suprax has a tensile strength of 805 lb./sq. in. on the original cross-section and 2,850 lb./sq. in. on the ultimate cross section. Its softening point (154° to 173°F.) was determined on thin sheet fixed at the end of a glass tube containing a known weight of mercury, and gradually heating in a water bath. The initial softening point is taken when the material begins to sag, and the final when the mercury breaks through the sheet.

Rubber wax compound made to a softened form has been developed as a sealing and insulating medium for joints in cables, as a box compound and for similar purposes. It has the advantage of being quite plastic and workable at hand temperatures, thereby overcoming the difficulties met in the use of ordinary thermoplastic compounds which require heat for their application. When applied to bare strands and the ends of cables it overcomes osmosis and moisture troubles, and protects generally against climatic conditions, moisture creepage, and corrosion, having a dielectric value of 150 volts per mil. It can also be used for sealing and separating joints in metal to prevent noise and rattle, and to overcome friction between metal and the like.

RUBBER TESTING
As Evaluated by Automotive Engineers

A Review of Tests Employed to Determine Specifications for Automotive Parts Combined with Descriptions of New Apparatus

By L. A. Danse

Metallurgist, Cadillac Motor Car Division, General Motors Corporation

ABOUT twelve years ago, when rubber began to be used in the automotive industry for purposes other than cooling system hose, the Metallurgical Laboratory of the Cadillac Motor Car Division of the General Motors Corporation began to experiment with various rubber compounds in an effort to formulate physical specifications which could be utilized by design engineers on a standardized basis. There is little doubt the metallurgists of other automobile manufacturing concerns were similarly occupied at the time.

The variations in compounds known and used by rubber technologists are legion—were, even twelve years ago. Therefore, guided by experience in working with steel and even with non-ferrous metals, it was early deemed essential that some measure of simplification and standardization be attained if automotive engineers were to acquire confidence in rubber as a convenient utility, instead of regarding it as a novel and interesting, but strange and incomprehensible, material.

Rubber showed definite promise of utility despite the lack of compound standardization. Accordingly, as the automotive engineers were concerned only with physical properties which would enable them to estimate design characteristics, properties which would enable them to largely eliminate the necessity of continued trial-and-error tests, it was immediately decided to specify rubber parts by means of physical requirements.

That decision was a fortunate premise, especially as the chemistry of rubber compounds is so complex as to make that angle of specification utterly impracticable. Furthermore, as many members of the modern rubber industry will recall, available knowledge of rubber chemistry was a closely guarded secret even a decade ago. This to-be-regretted secrecy, long since dispelled, made the question of chemical specifications imponderable to the automotive engineer whose interests are those of definite, available, common knowledge—necessarily scientific, but essentially practical.

Some members of the rubber industry, broad in their viewpoints, saw the advantages to be gained through wider dissemination of knowledge regarding automotive rubber parts and they made every effort to provide data, samples, testing procedures, testing equipment, and other facilities. This simplified the problem and helped tremendously. By the end of 1929 enough data had been accumulated at Cadillac to enable us to formulate physical specifications for engine mount cushions, body pads, brake diaphragms, centering grommets, sliding or flexing grommets, mats and covers, bumpers, fillers, gaskets and several other parts.

Oddly enough, there was a small group of rubber technologists who minimized and even ridiculed the efforts of the automotive metallurgists. But the answer to their scoffing and incredulity were the written specifications in the engineers' data books. Once started, most of the rubber manufacturers accepted the new order of things and lent support to it by offering valuable suggestions to improve the specifications.

Early in 1930 a list of automotive rubber specifications was published. It provoked wide discussion among users of automotive rubber parts as well as rubber manufacturers. It apparently struck a responsive chord and was soon endorsed even by those who had originally combatted the idea. The tabulation of physical properties enabled design engineers to start their layouts with some basic knowledge of details with regard to the physical properties of rubber. Inasmuch as the American Society for Testing Materials had a committee on the testing of rubber,

The new Gogan (Model 64) testing machine which is being used to measure engine and body mountings in compression.

A.S.T.M. methods were utilized insofar as possible. The additional testing methods needed were soon developed with the help of rubber technologists.

The most essential tests are those which give an index to the quality of the rubber—the so-called aging tests. These tests show in a few hours what the life expectancy of the material may be and how it will change in its physical properties as it ages. For small parts, this may be determined by checking hardness and elasticity, then aging for one or two days in an oven at 158° F. (or 70° C.), after which hardness and elasticity are again checked. Thus an indication of the degree of resistance to change is obtained.

An even better test is to cut a ¼-inch thick disc with a surface area of ½ sq. inch. This disc is compressed 50% (to ⅛-inch thickness) in a fixture and heated to 158° F. for 24 hours. The fixture is then allowed to cool for 30 minutes, after which the rubber disc is removed and measured with a micrometer to find the "set" in thickness. There is, of course, special apparatus available on the market for determining this permanent set.

Another interesting test evolved over a period of time was that which shows whether and how cooling system hose is affected by hot water, anti-freeze solutions, corrosion inhibitors, etc., all of which may be used in cooling systems. In this test, sample hose is suspended in special boilers where it is exposed to steam, hot water, 50% alcohol solution and corrosion inhibitor solution for 100 hours or more. Any swelling or disintegration of the hose is checked by measuring before and after boiling, and if found beyond established limits will cause rejection of the material.

Development work on new testing procedures and new testing instruments in connection with automotive rubber parts is naturally being carried on constantly. At the Cadillac laboratories we are currently trying out two new types of testing instruments, both of which were developed in conjunction with the Gogan Machine Corporation of Cleveland, Ohio. One of them is a compression testing machine, called Model 64 by Gogan, and the other is a Model D-11 hardness tester.

The Model 64 compression testing machine is being used to measure engine mount cushions and body pads in compression. The available compression testing machines of the past have been too slow and inconvenient for production use on automotive parts. Engineers have desired to specify some mounts by deflection-weight figures, but have been prevented from doing so by the inability to secure machines with which production testing could be done rapidly and accurately.

The new machine is so designed that the measuring motions are free from friction or any other interference. Upper pressure pads, attached to the weighing mechanism, may be made in any shape or form. The lower anvil, upon which the specimen rests, and which is attached to the actuating mechanism, may be made to fit any kind of rubber or mounting. Fifty or more parts per minute may be tested.

In operation, the specimen is laid on the anvil and the actuating mechanism is put into motion. This action raises the anvil and pushes the specimen against the upper pressure pad, thus picking up the minor load. The major load is picked up when the actuating mechanism moves the specimen up. At the instant where the minor load is picked up an electro-magnetic device causes the dial test indicator mechanism to take hold and the dial starts to register.

Accordingly, the first compressing of the specimen, for a few thousandths of an inch, serves only to insure

Gogan Model D-11 Penetrating Rubber Tester

good contact of the specimen between the anvil and the pressure pad. The dial test indicator reads from the picking up of the minor load to the major load, so that the deflection indicated on the dial test indicator is the deflection between the two loads. The indicator is graduated in thousandths and has a range of motion of one inch, which is more than any of the current production mountings will deflect.

Minor loads are adjustable from 10 to 100 kgs., or from 20 to 200 pounds, while major loads are adjustable from 40 to 200 kgs., or from 80 to 400 pounds. These load adjustments make the instrument suitable for measuring any of the ordinary automotive engine mounts or body pads.

The second testing instrument being tried out is the Gogan Model D-11 Frictionless Penetrating Rubber Tester. The fundamental idea of this new tester is similar to that of the tester recommended by Committee D-11 of the American Society for Testing Materials, and follows the principles incorporated in the Bosomworth-Firestone Penetrometer. The new D-11 instrument is light and is calibrated to close standards of precision. It is easily duplicable. The diameter of the pressure foot is ⅝-inch, weight 2 to 5 pounds; the diameter of the hemispherical indentor is 3/32-inch, load 2 or 3 pounds.

Development work is also going on to perfect a small, hand type hardness tester which will be convenient to test production rubber parts in automotive plants, one which will supplement the larger D-11 instrument, which is a bench type.

Although the rubber specifications in the General Motors Standard Book, Vol. II, have been frequently revised and added to, it was recently decided by the company's Metallurgical Committee, which controls materials, that general revision and amplification was needed. A special sub-committee, comprised of rubber technologists, chemists, engineers and metallurgists, is now at work on this project. In addition to the General Motors Rubber Sub-Committee, a larger joint committee of the A.S.T.M. and S.A.E. has been formed (known as Technical Committee A of Automotive Rubber Products) and has already started work on coordination of specifications.

Rubber Division, A. C. S., Holds Meeting in Boston

Division Sponsors Society's General Meeting and Banquet as Part of Program Commemorating Goodyear's Discovery of Vulcanization in 1839; Symposium on Vulcanization Held

COMMEMORATION of the one hundredth anniversary of the discovery of vulcanization of rubber by Charles Goodyear at Woburn was the theme of the 98th meeting of the American Chemical Society held in Boston, Mass., the week of September 11. Special exercises constituted the general meeting of the Society held at Symphony Hall on Wednesday afternoon September 13, and were continued at the Society's annual banquet, held at the Copley Plaza Hotel on Wednesday night, both of which were conducted under the auspices of the Division of Rubber Chemistry. In connection with the occasion, an extensive exhibit of historical interest to the rubber industry was held in the Copley Plaza Hotel, and attracted numerous visitors. The entire program was the culmination of two years of effort on the part of a special Goodyear Centennial Committee, acting for the Division.

In addition, the technical sessions of the Rubber Division itself, held on Thursday and Friday, September 14 and 15, at the Parker House, featured a Symposium on the Vulcanization of Rubber. The Division also elected new officers for the 1939-40 season, heard reports from several committees, adopted a complete new set of by-laws, and approved the establishment of a Charles Goodyear Lecture.

Four Papers at General Meeting

On Wednesday afternoon the General Meeting of the American Chemical Society was held at Symphony Hall. It was conducted under the auspices of the Rubber Division and was devoted to a commemoration of the discovery of vulcanization by Charles Goodyear in 1839. The meeting was opened promptly at 2:00 P.M. by Charles A. Kraus, president of the Society, who greeted the audience and then turned the meeting over to George K. Hinshaw, the chairman of the Rubber Division, who presided over the meeting proper.

Before introducing any of the speakers on the afternoon's program, Chairman Hinshaw briefly reviewed the history of the Rubber Division, organized in 1919, and of its predecessor, the India Rubber Section of the A.C.S., founded in 1909. He then very briefly alluded to the reason for the commemoration exercises and told of Charles Goodyear's trials and tribulations before finally vulcanizing rubber. He also expressed the Rubber Division's appreciation to the Executive Committee of the A.C.S. for the privilege of preparing the special program for the day.

In concluding his opening remarks, Chairman Hinshaw read two resolutions which had been approved by the Society's Executive Committee, one of which dealt with the decision to continue an annual award in pure chemistry research and the second with a decision to sponsor the nomination of Charles Goodyear to the Hall of Fame with funds to be provided to carry out the decision. (More information on this resolution will be available shortly). The Chairman then introduced the first speaker, E. B. Babcock, chief chemist, Firestone Tire & Rubber Company.

Taking the problem of "What Is Vulcanization?" Mr. Babcock said that potentialities of future research and development in the rubber industry appear almost limitless in the light of the advancement that has been made in recent years. He traced the early history of the rubber industry, back as far as its discovery by Columbus, told of the roles played by Macintosh, Hancock, Thomson and others, and then launched into the question of vulcanization. He mentioned that while theories are plentiful no exact definition of the term has yet appeared. He also stated that because of the price fluctuations of crude rubber the manufacturer is often hard put to estimate his costs.

A. A. Glidden, development manager, Hood Rubber Company, was the second speaker. His topic was "The Work of Thomas Hancock." Terming Hancock a "courageous pioneer," Mr. Glidden divided his talk into three parts: (1) Hancock the Man; (2) His Achievements; and (3) An Evaluation of His Work. He discussed the early experiments conducted by the British inventor, stressing his methodical methods of arriving at a conclusion, interspersing his account with humorous anecdotes.

Continuing, Mr. Glidden described Hancock's development of rubber thread, his application of the thread to apparel, the construction of the first masticator and, later, that of the first rubber cutting device. He also told of the inventor's experiments with latex, particularly the saturation of fibers which produced leather-like materials, and then traced his vulcanization experiments. He stressed the point that the British courts

1939-40 Officers of the RUBBER DIVISION, A.C.S.

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Sgt.-at-Arms: C. P. Hall (C. P. Hall Co.)

finally upheld Hancock over Goodyear as the real discoverer of vulcanization. In concluding his talk, Mr. Glidden called Hancock the "Father of the Rubber Industry."

The third paper on the program, "The Work of Charles Goodyear," was prepared and was scheduled to be delivered by R. W. Lunn, managing director, Leyland & Birmingham Rubber Company, of England, but the war prevented Mr. Lunn's appearance. His paper was read by W. B. Wiegand, director of research, Columbian Carbon Company. Expressing keen admiration for Goodyear's persistence against all obstacles, including poor health and lack of funds, the author dwelt upon the American inventor's major developments before achieving his ultimate object, *i.e.*, the development of his solarizing method, his acid-curing method, and, finally, the actual combination of rubber with sulfur.

Mr. Lunn's paper also made mention of the long and bitter legal struggles between Goodyear and Horace H. Day, his relentless foe, which were climaxed by the Great India Rubber Case, the decision of which was entirely favorable to Goodyear. In closing his paper, the British executive stated that in spite of all the work which has been done on vulcanization of rubber during the past century, nothing important has happened to change the fundamentals of the process developed by Goodyear. Incidentally, Mr. Lunn has been placed in charge of the manufacture of all gas masks in England by the British Government.

The next, and concluding, speaker was W. A. Gibbons, director of general development, United States Rubber Company, who spoke on "The Rubber Industry Since 1839." He first told of the trouble of the early rubber manufacturers, prior to the discovery of vulcanization in 1839, and then discussed the scientific and technical development which took place between 1839 and 1890, mentioning the fact that although these developments were of extreme importance they were not adapted to the rubber industry until the turn of the century.

The real development in the rubber industry, Dr. Gibbons continued, came in the early 1900's and thereafter. In turn he discussed the discovery of organic accelerators, the actions of which on rubber are still unexplained, the adoption of zinc oxide as a filler and later carbon black, and the introduction of antioxidants and the other host of compounding ingredients now known and used to excellent advantage.

Modern developments were next taken up by the speaker, starting with that of the use of latex. In this connection he listed a number of such uses, including that in tire cord and in the manufacture of thread. He then described the various so-called synthetic rubbers which are now available, stressing the point, however, that a real synthetic rubber, one with all of the properties and characteristics of natural rubber, has not yet been developed. Dr. Gibbons then made use of the industry's statistics to indicate the tremendous gains it has made in the past century. In closing, he stated that the commemorative meeting was not Goodyear's memorial, but that the modern rubber industry, with all of its diversifications, was the real memorial.

Division Sponsors Society Banquet

Commemoration of the 100th anniversary of the discovery of vulcanization was continued at the annual banquet of the A.C.S., which was held at the Copley Plaza Hotel on Wednesday evening, September 13, under the auspices of the Rubber Division. Approximately 1,000 members and guests, a capacity crowd, attended the banquet, and not a single seat remained empty. In fact, because of the unprecedented demand for tickets, the entire program, which was broadcast, was heard by several hundred through an amplifying system set up in the ballroom of the Hotel Statler, several blocks away.

John M. Bierer, of the Boston Woven Hose & Rubber Company, Chairman of the Goodyear Centennial Committee, acted as toastmaster, and introduced each of the three scheduled speakers, who were: Paul W. Litchfield, president, Goodyear Tire & Rubber Co.; Dr. Karl T. Compton, president, Massachusetts Institute of Technology; and Dr. James B. Conant, president, Harvard University. Centered over the speaker's table was an original Healy portrait of Charles Goodyear, loaned for the occasion by the United States Rubber Co. The portrait was bedecked with flags.

Bierer Reviews Industry's History

Before introducing the first speaker, Toastmaster Bierer briefly reviewed the history of the rubber industry and made the prediction that there would be far greater progress within the next thirty years than there was during the last thirty, chiefly in the development of materials superior to rubber for specific purposes. Referring to Goodyear and Hancock, he said that both had a vision of the possibilities of vulcanized rubber and that Goodyear conceived the idea and Hancock developed it and made it a success. He then introduced Mr. Litchfield, first giving a quick resume of the latter's association with the rubber industry.

Discussing "Rubber's Position in Modern Civilization," Mr. Litchfield said that 4,000,000 people the world over are employed in the rubber business; that almost $3,000,000,000 are invested in facilities for the growing, manufacture and distribution of rubber; that there are more than 50,000 different and useful products made from rubber; and that more than two billion pounds of pure rubber are consumed in a normal year. In the final analysis however, he said, the influence and importance of rubber is so all-pervasive as to defy any rule of thumb.

The second speaker, Dr. Compton, spoke on "Looking Forward in Research", and foresaw the elimination by science of major causes of war. "To the extent that the scientist synthetically produces petroleum, rubber, coal and other essential materials, the need for employing armies and navies to acquire the world's natural resources will be removed," he declared, and then stated that when substitutes for rubber are produced which are satisfactory for automobile tires and which can be produced at a reasonably competitive price, then one of the great causes of anxiety and international haggling will have been removed. The speaker also predicted a continually accelerated rate of scientific discovery.

The third and final speaker, Dr. Conant, talked on "Lessons from the Past." He called rubber chemists merely children of the great modern revolution in society's habits of transportation. He went further and said that the claim might be made "that our scientific knowledge of large molecules and the chemical reactions which produce them is but a by-product of the ubiquitous motor car." The growth of rubber manufacturing was intimately associated with the automobile industry, Dr. Conant stated, and 50 years ago a celebration of Goodyear's discovery would have awakened almost no interest among chemists, for the science of rubber chemistry was hardly born, and no interest among the general public because the automobile was not yet known.

Corner of the historical exhibit at the Copley Plaza Hotel in which Hancock's first steam engine driven masticator is seen.

A number of favors, purchased with funds contributed by suppliers to the rubber industry, as well as several rubber manufacturers, were given at the banquet. One of these was a centennial volume of the writings of Charles Goodyear and Thomas Hancock comprising Goodyear's *Gum-Elastic and Its Varieties, with a Detailed Account of Its Applications and Uses and of the Discovery of Vulcanization* and Hancock's *Personal Narrative of the Origin and Progress of the Caoutchouc or India-Rubber Manufacture in England.* Another was a souvenir booklet, well prepared and executed, which contained all of the talks given at the banquet as well as those delivered earlier in the day at the general meeting of the A.C.S. Still another was a sterling silver engraved cocktail shaker. The souvenirs were made possible by the generous contributions of the following companies:

American Cyanamid & Chemical Corp., American Zinc Sales Co., H. A. Astlett & Co., Robert Badenhop Corp., Barrett Co., Bibb Mfg. Co., Binney & Smith Co., Boston Woven Hose & Rubber Co., Godfrey L. Cabot, Inc., Callaway Mills, Cleveland Liner & Mfg. Co., Columbian Carbon Co., Converse Rubber Co., Dill Mfg. Co., E. I. du Pont de Nemours & Co., Eagle-Picher Lead Co., Emerson Apparatus Co., Farrel-Birmingham Co., Firestone Tire & Rubber Co., Fisk Rubber Corp., Flintkote Co., Foxboro Co., General Atlas Carbon Co., Givaudan-Delawanna, Inc., B. F. Goodrich Co., Goodyear Tire & Rubber Co.

R. W. Greeff & Co., C. P. Hall Co., Hecht, Levis & Kahn, Inc., Heveatex Corp., Hodgman Rubber Co., Holliston Mills, Inc., J. M. Huber, Inc., J. H. Lane & Co., Littlejohn & Co., Midwest Rubber Reclaiming Co., Monsanto Chemical Co., Moore & Munger, H. Muehlstein & Co., National Erie Corp., Naugatuck Chemical, New Jersey Zinc Co., Pequanoc Rubber Co., Rare Metal Products Co., John Robertson Co., A. Schrader's Son, A. Schulman, Inc., Henry L. Scott Co., Seamless Rubber Co., Simplex Wire & Cable Co., Somerset Rubber Reclaiming Works.

Spadone Machine Co., Stamford Rubber Supply Co., Stauffer Chemical Co., J. P. Stevens & Co., St. Joseph Lead Co., C. J. Tagliabue Mfg. Co., Thiokol Corp., Thompson, Weinman & Co., Titanium Pigment Corp., Turner Halsey Co., United Carbon Co., U. S. Rubber Co., U. S. Rubber Reclaiming Co., R. T. Vanderbilt Co., Vansul, Inc., Vultex Chemical Co., Wellington Sears Co., C. K. Williams & Co., Charles T. Wilson Co., and Wishnick-Tumpeer, Inc.

Two-Day Technical Session

The Rubber Division held its technical sessions, featuring a Symposium on the Vulcanization of Rubber, on Thursday and Friday, mornings and afternoons, at the Parker House, headquarters for the week. In all, 25 papers were delivered, 16 of them comprising the symposium. In addition to the delivery of technical papers, the Crude Rubber Committee made a report while the meeting witnessed the election of officers and the approval of several resolutions. Approximately 350 attended the sessions.

The papers comprising the symposium, which occupied both of Thursday's sessions and part of Friday morning's session, together with the names of authors, follow:

Vulcanization of Rubber, Harry L. Fisher; *Physical Changes Induced by Vulcanization,* W. W. Vogt; *Effect of Vulcanization on the Structure of Rubber,* W. F. Busse; *Some Relations Between Vulcanization and Reinforcement,* C. R. Park; *X-Ray Structure of Vulcanized Rubber,* G. L. Clark; *Effect of Variability of Rubber on Vulcanization,* Edgar Rhodes (read by R. A. Crawford, of Goodrich); *Methods for the Control of Vulcanization by the Individual Incorporation of Vulcanizing Agents,* D. F. Twiss (read by C. Park, of Firestone); *Theories of Acceleration,* L. B. Sebrell.

Vulcanization of Rubber from a Thermodynamic Viewpoint, Ira Williams; *Mechanism of Oxidation of Vulcanized Rubber,* A. R. Kemp, J. H. Ingmanson, and G. S. Mueller (read by Mr. Ingmanson); *Influence of Vulcanization on Oxidizability—Vulcanizing Agents Other than Sulfur,* Charles Dufraisse and F. Le Bras (read by A. R. Kemp, of Bell Telephone Laboratories); *What Is Optimum Cure?* J. C. Walton; *Temperature Coefficient of Vulcanization,* R. H. Gerke; *Effect of Reclaimed Rubber on Temperature Coefficient of Vulcanization,* W. S. Coe; *Low-Temperature Set as a Measure of State of Vulcanization,* J. H. Fielding, and *Vulcanization of Latex,* C. E. Bradley.

General papers given, which occupied part of Friday morning and most of the afternoon, were:

Rubber-Like Properties of Polybutene, W. J. Sparks, I. E. Lightbown, L. B. Turner, per K. Frolich, and C. A. Klebsattel (read by Mr. Sparks); *Catalytic Dehydrogenation of Monoölefins to Diolefins,* A. V. Grosse, J. C. Morrell, and J. M. Mavity (read by Dr. Morrell); *Dielectric Constant of*

Rubber-Carbon Black Mixtures, C. M. Doede; *Practical Evaluation of Commercial Rubber Carbon Blacks by X-Ray Diffraction*, G. L. Clark and H. D. Rhodes (read by Dr. Clark); *Statistical Theory of the Elastic and Thermoelastic Properties of Vulcanized Rubber*, Eugene Guth.

A New Method for Measurement of the Permeability of Rubber to Various Gases, A. S. Carpenter and D. F. Twiss (only a lengthy abstract of which was read by S. Gehman, of Goodyear); *Dynamic Fatigue Life of Rubber*, S. M. Cadwell, R. A. Merrill, C. M. Sloman, and F. L. Yost (read by Dr. Cadwell); *The Analysis of Rubber for Antioxidants*, L. H. Howland and E. J. Hart (read by Dr. Howland); and *The Chloroform Extract of Reclaimed Rubber*, Henry F. Palmer and F. L. Kilbourne, Jr. (read by Dr. Palmer). Abstracts of all of the papers presented were published in the August, 1939, issue of THE RUBBER AGE.

Papers on Rubber at Symposiums

In addition to its own two-day technical sessions, the Rubber Division participated in two separate symposiums, held on Monday and Tuesday, September 11 and 12, respectively. The symposium on Monday was on Plastics and Resins from Hydrocarbons, and was held jointly with the Divisions of Petroleum and Paint & Varnish Chemistry. Nine papers were given at this symposium, including one on "A Study of the Effects of Lubricating Oils on Neoprene Vulcanizates," by Donald F. Fraser of the Rubber Chemicals Division of E. I. du Pont de Nemours & Company. An abstract of this paper follows:

> Neoprene vulcanizates when immersed in commercial lubricating oils reach equilibria with respect to swelling or volume increase. The time necessary to reach equilibria depends upon the temperature and the chemical components of the oil. It is shown that the volume increase in a particular oil is a logarithmic function of the viscosity-gravity constant and a direct function of the gravity index.

Tuesday's symposium was on X-Ray Studies of Substances of High Molecular Weight. It was held in conjunction with the Divisions of Physical and Inorganic, Colloid and Organic Chemistry. One of the eight papers in this symposium was given by S. D. Gehman, of the Goodyear Tire & Rubber Company, under the title of "The Contribution of X-Ray Research to the Knowledge of Rubber," an abstract of which follows:

> The publication by Katz in 1925 of the fiber diagram for stretched rubber held forth the possibility that x-ray diffraction might disclose the molecular basis for elasticity. Consequently the discovery was of great interest to research workers in this field. Many of the essential facts concerning x-ray diffraction by rubber were found out in the investigations which immediately followed.
>
> The interpretation of the diagram, that is, the determination of the structure of the unit cell, has remained as a problem which has not been definitely solved. The first detailed model for the unit cell was worked out by Meyer and Mark. More recent structures proposed by Lotmar and Meyer, by Sauter and by Morss, indicate that a unique solution for the diagram as it is now known either cannot be found by the methods employed or does not exist.
>
> This uncertainty in the structure of the crystal lattice has not hindered the use of x-ray diffraction as a means for interpreting, in a more general way, the nature of the molecular structure of rubber and a great deal of information has been obtained concerning molecular processes in rubber. In the correlation of the physical properties with the x-ray diffraction patterns, theoretical limitations exist in that the pattern does not disclose the length of the molecules, or, in a direct way, the lattice forces.

Two papers of special interest to the rubber industry were delivered before the Division of Colloid Chemistry at its Monday afternoon session. These were "Hevea Latex—Effect of Proteins and Electrolytes on Colloidal Behavior," by W. G. Straitiff and A. R. Kemp (Bell Telephone Laboratories) and "Structural Studies of the Vulcanization of Rubber Under Stretch," by E. A. Hauser and I. N. Smith (M.I.T.). Abstracts of both papers follow:

Hevea Latex—Effect of Proteins and Electrolytes on Colloidal Behavior. W. G. Straitiff and A. R. Kemp.

The fundamental factors governing the colloidal stability and coagulation phenomena of ammoniated Hevea latex have been investigated through a study of its proteinic serum constituents. Latex serum was freed from all rubber particles by a special technique of filtration and three conjugated glyco-proteins were separated by salting out and dialyzing methods. The procedures used did not yield an absolutely protein-free serum, indicating the presence of additional proteins.

The colloidal properties of the protein hydrosols were independently studied and the results related to the corresponding properties of latex. This showed that there are two proteins, called A and B, primarily responsible for the colloidal behavior of the rubber particles as it exists in ammoniated latex.

Salts of the type MeX, MeX_2, and MeX_3 in combination with acids and alcohols were found greatly to aid the coagulation of the protein hydrosols. Well dialyzed latices prepared in specially constructed dialyzing apparatus were found to behave similarly and showed a tremendous increase in their resistance towards coagulation with acetic acid. These results have shown that ammoniated latex exhibits a "salt effect" in its coagulation reactions.

The coagulation of latex by polar-nonpolar solvents has been studied quantitatively using dialyzed latex with definite amounts of added salts and methyl alcohol as an example. The curves from these coagulation reactions definitely indicate that coagulation involves more than just simple dehydration of the protein molecules.

The mechanism by which the absorbed proteinic sheath on the surface of the rubber particle functions as a stabilizer for ammoniated latex has been discussed in the light of the ampholytic nature of native soluble proteins.

Structural Studies of the Vulcanization of Rubber Under Stretch. E. A. Hauser and I. N. Smith.

During the past years two patents have been issued covering vulcanization of rubber whilst under tension. It is claimed that a rubber with increased tensile and other valuable properties is thus obtained. No explanation for such improvement is offered or even attempted. Considerable advances have also been made recently toward a better understanding of the chemical reactions during vulcanization, so that a scientific study of the vulcanization of rubber under stretch seemed to offer new possibilities from a structural point of view.

To avoid excessive flow during stretch accelerated latex compounds were prepared under conditions excluding premature vulcanization. These compounds were then cured under equal conditions but at different degrees of elongation and the most characteristic mechanical properties determined.

It could be demonstrated that a maximum of elongation was retained with samples cured under a stretch of 400 to 500%, independent of the amount of sulfur present in the stock. Final tensiles show a steady decline, whereas the amount of combined sulfur remains constant.

X-ray diffraction patterns of rubber vulcanized under stretch showed no signs of molecular alignment. Sharp fiber patterns developed only when keeping the specimen stretched just short of its breaking point during exposure. This indicates random rearrangement of originally aligned unvulcanized molecules during cure and permits drawing valuable, so far not possible, conclusions as to structural changes of rubber during vulcanization.

New Business Activities

The business meeting of the Division was not held at the end of the two-day session as scheduled, but matters requiring the attention of the members were brought up in between papers and were acted upon at such times. An important resolution was advanced and unanimously approved on Friday morning. Based on an idea presented by A. R. Kemp of the Bell Telephone Laboratories some time ago, it was decided to establish a Charles Goodyear Lecture under the sponsorship of the Division.

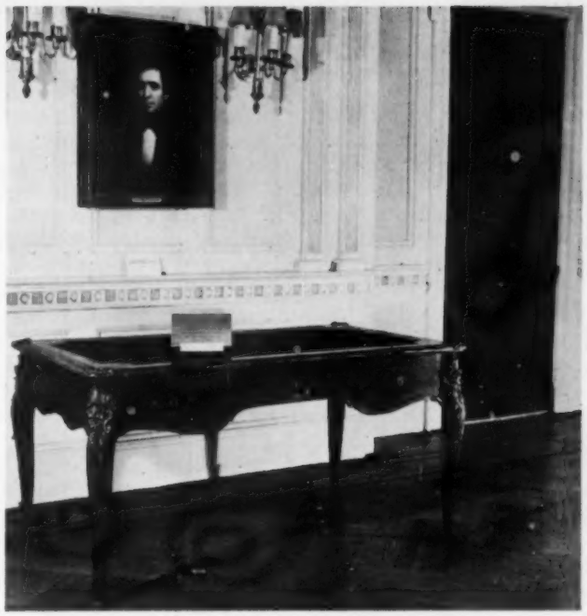
The resolution provides for a Lecture Committee composed of the past seven chairmen of the Division, with the retiring chairman of the year to automatically become chairman of the Committee. This Committee will select annually at its discretion one individual whose work importantly contributes to the knowledge of rubber technology and will present to him a suitable certificate and an honorarium of $200.00. The selected lecturer, who must receive 5 of the 7 Committee votes, will deliver a paper before the annual meeting of the Rubber Division. Nominations for the lecturer each year may be made by any member of the Division in writing to the Committee through the secretary of the Division.

At another point a new set of by-laws for the Division, drawn up by a special committee headed by C. W. Christensen, treasurer of the Division, was presented to the meeting and it was unanimously adopted with minor changes recommended by the officers of the American Chemical Society. Space does not permit the publication of the new by-laws in this issue, but they will appear in a subsequent number of this journal.

Later, Chairman Hinshaw turned the meeting over to Secretary Cramer who announced that while many technical organizations from abroad had promised to send delegates to the meeting, the situation in Europe prevented their appearance. He did, however, introduce Mr. T. R. Griffith of the Rubber Laboratory of the National Research Council of Canada who expressed his appreciation for the privilege of attending and who brought the good wishes of the Council.

The floor was then taken by H. L. Trumbull (Goodrich) as chairman of the Nomenclature Committee, set up after the Baltimore meeting last Spring, who reported that the Committee was beginning to thoroughly review the subject and that several recent papers on it were being closely studied. He also said that the Committee would work closely with a similar committee organized for the same purpose. Finally, he made a request for funds which would permit the Committee to submit its ideas to the entire membership by mail and, in the interim, suggested that any member was invited to send his own ideas on nomenclature along for consideration.

The annual election of officers was held late Friday afternoon and resulted in the following selections: Chairman, E. B. Curtis (R. T. Vanderbilt Co.); Vice-Chairman, R. H. Gerke (U. S. Rubber Co.); Secretary, H. I. Cramer (University of Akron); Treasurer, C. W. Christensen (Monsanto Chemical Co.); Sergeant-at-Arms, C. P. Hall (C. P. Hall Co.); Executive Committee, W. Busse (B. F. Goodrich Co.), A. Nellen (Lee Rubber & Tire Co.), and J. H. Ingmanson (Bell Telephone Laboratories). Before the end of the sessions, the retiring chairman, Mr. Hinshaw, thanked the membership of the Division for the excellent cooperation it had extended to the officers during his tenure of office, and then turned the concluding portion of the meeting over to the new chairman, Mr. Curtis.



Massive hard rubber table made by Goodyear and an oil portrait of the inventor which were on display during the Boston meeting.

Crude Rubber Committee Report

The 8th report of the Division's Crude Rubber Committee was made by R. H. Gerke (U. S. Rubber), its chairman, during the Friday morning session. In the report it was revealed that the tentative procedures for testing the variability of normal and concentrated latex are completed and will be published shortly; that a practical method for the procedure for quantitative dirt is being investigated; that work is in progress on the development of a method for testing the variability of rubber with respect to plasticity, with both viscosity and retentivity being considered; and that further progress has been made on the development of an apparatus for the determination of mechanical stability of latex.

Dr. Gerke also made mention of the fact that consideration is being given to the possibility of securing the data and publishing a paper which will give to the producers the mean value for the rate of vulcanization of first-grade rubbers as observed in the various factories in the United States. Data of this type would be useful to the producers in selecting a rate of cure which would be satisfactory to consumers of crude rubber. There is no doubt that the Crude Rubber Committee has been exceptionally active and its work should soon bear practical fruit.

Rubber Relics Shown in Exhibit

One of the interesting features of the Centennial Meeting was a two-room exhibit of historical rubber relics located in the State Suite of the Hotel Copley Plaza. The various exhibits were arranged about he walls of the rooms, housed in showcases for the most part. In one showcase there were a number of rubber products dating back to 1856, including hydraulic hose, rubber flooring and tile, clothes wringers, horseshoe pads, tubing, life preserving apparatus, belt joints, printing plates, hat blocks, furniture springs, and endless, flat and V-belts.

In this same exhibit there were original United States Government patent models of a dental vulcanizer (1879), machine for placing tubing on spindle shafts (1879), tubing machine (1868), device for making

rubber stereotypes (1871), machine for preparing rubber cloth (1857), and a machine for cutting sheets of rubber (1875). All of these individual exhibits, as well as others on display, were loaned by various companies, societies and individuals for the occasion.

A second showcase held a number of old notebooks containing rubber formulas in use long before the days of accelerators, anti-oxidants, fillers and other modern compounding ingredients. Rubber-tired roller skates and a hard rubber whiskey flask were also displayed in this case. An interesting exhibit was that prepared by the United Shoe Machinery Corporation in which old shoes from the United States, England, Brazil, Japan, Bolivia and Peru were shown. Several gum shoes made by South American natives were included.

Still another showcase was devoted to the boot and shoe industry, comprised of specimens loaned by various sources, in which rubber footwear made by the following rubber companies, some long since extinct, with dates of manufacture shown, was displayed: Meyer Rubber Co. (1871), Goodyear India Rubber Glove Co. (1893), Hood Rubber Co. (1860), American Rubber Co. (1895). The original display of miniature rubber footwear, which was prepared for and shown at the Columbian Exposition in Chicago in 1893, was also on exhibit.

Moving along to the right, the visitor next saw a showcase containing two original licenses for the manufacture of boots and shoes, one given by Charles Goodyear to William Judson, friend and associate, dated August 4, 1856, and the other granted to Christopher Meyer by William Judson, dated August 9, 1856. Then followed a showcase devoted to a display of old rubber boots made in the early 1900's, many of which were in actual use up to a few years ago. The next case contained a display of modern dress, work and sport rubber footwear, including sandals, tennis shoes, etc.

Moving along, one next came to a display of modern belting, hose and packing, miscellaneous synthetic rubber products, and various types of rubber-covered wires and cables, all contained within a single showcase. Appropriately, the following exhibit was devoted to an open display of rubber compounding ingredients of all kinds which was followed by one displaying miscellaneous types of rubber, including crumb, powdered, pale crepe, ribbed smoked sheets, rolled brown and latex as well as specimens of the several so-called synthetic rubbers, such as neoprene, Thiokol and Perbunan.

The final display in this first room was one of new and old tires, some of the latter dating back to 1908. The wide variation in treads was clearly indicated by the exhibit of modern tires, of which there were approximately 20. Also displayed was one of the newer giant earth mover tires. Included in the exhibit of old tires was a carriage tire of 1905, an airplane tire of 1910, and several smooth, non-tread tires made around 1915. A number of automotive rubber parts and accessories were also exhibited in this particular display.

The early history of the rubber manufacturing industry was effectively portrayed in the second room of the two-room special exhibit. On display were a number of hard rubber products made by Charles Goodyear, including a massive table, a cane which he presented to Col. Samuel Colt in 1850, a similar cane he himself used, several elaborately carved knives, all loaned by the U. S. Rubber Company, and a hand-carved pipe which was exhibited at the Paris Exposition in 1857, loaned by Goodyear Tire & Rubber Co. A number of original patents given to Goodyear, and which he exhibited at the Crystal Palace in London in 1851, were also shown. Oil paintings of Charles Goodyear, and of his brother, Nelson, were on view, as was a bronze bust of the discoverer of vulcanization, all loaned by the New Haven Historical Society.

The important role in the early progress of rubber manufacturing played by Thomas Hancock was aptly illustrated by the display of his first steam engine driven masticator, which was built and installed in England in 1836. This mill was driven by a "grasshopper" engine, a picture of which was also displayed. Other interesting exhibits in this room included a showcase of rubber relics, such as rubber plaques, mats, tobacco pouches and boots, together with early catalogs, original books, factory formulas, etc., and a display of original and blown-up pages from the first, second and third issues of the *India Rubber World*, which celebrates its fiftieth anniversary next month. In addition to the displays described, there were numerous portraits, photographs, lithographs and original licenses and commemorative scripts on the walls.

The officers and members of various committees, particularly the Centennial Committee, are to be heartily congratulated on a difficult job exceptionally well done. Both the general meeting of the A.C.S. and the banquet were acclaimed for their smoothness, precision and substance. The Centennial Committee was composed of John M. Bierer (Boston Woven Hose), as chairman, and A. A. Somerville (Vanderbilt), W. B. Wiegand (Columbian Carbon), and C. R. Boggs (Simplex Wire & Cable). E. B. Curtis (Vanderbilt) and G. K. Hinshaw (Goodyear) acted as ex officio members.

Collyer Made President of Goodrich

Just as this issue was going to press word was received that John Lyon Collyer, identified with both the American and British rubber industries, was elected president of the B. F. Goodrich Company, of Akron, succeeding Samuel B. Robertson, resigned. The latter finished his twentieth year of service with Goodrich only two months ago.

Mr. Collyer, the new president, has been joint managing director of the Dunlop Rubber Co., Ltd., of England, since 1937, a post he resigns to join Goodrich. It is understood that he will return to the United States within a few weeks to assume his new responsibilities.

The new Goodrich executive was born at Chelsea-on-the-Hudson in 1894. He was graduated from Cornell University in 1917 as a mechanical engineer and immediately joined the staff of the Bethlehem Shipbuilding Co. He later entered the employ of the Dunlop Tire & Rubber Company in Buffalo, N. Y.

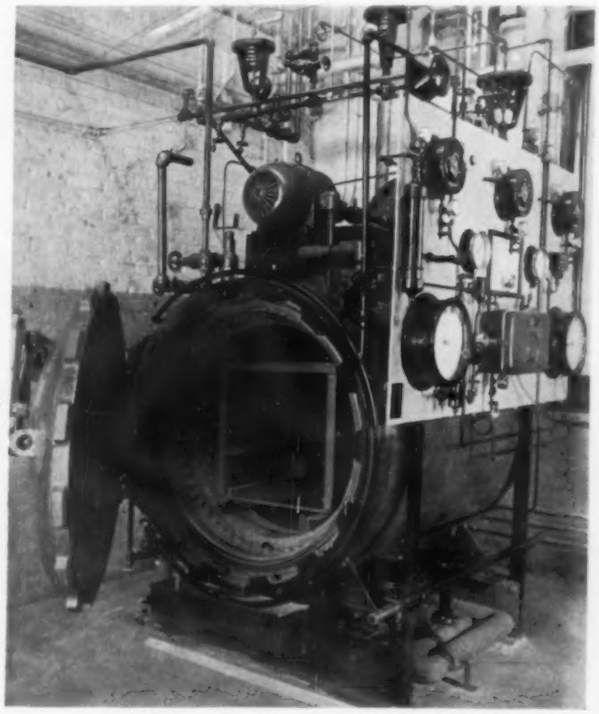
From 1923 to 1929 Mr. Collyer held the position of vice-president of Dunlop. In the latter year he was transferred to England as works director of the Fort Dunlop plant and in 1931 he was named controller of manufacture. In 1936 Mr. Collyer joined the Dunlop board and was charged with the responsibility of directing the company's manufacturing operations throughout the world. One year later, in 1937, he became joint managing director of the company.

EDITOR'S NOTE: The articles entitled "New Butadiene Rubber" and "Restoring Facial Defects by Means of Vulcanized Latex," scheduled for pages 347 and 348 of this issue, as listed on the contents page, are being held up in order to give our readers a complete story of the Boston meeting of the Rubber Division, A.C.S.

Special Testing Apparatus in the DuPont Rubber Laboratories

Descriptions of Special Apparatus Conceived and Designed by DuPont Engineers and Modifications of Some Standard Equipment

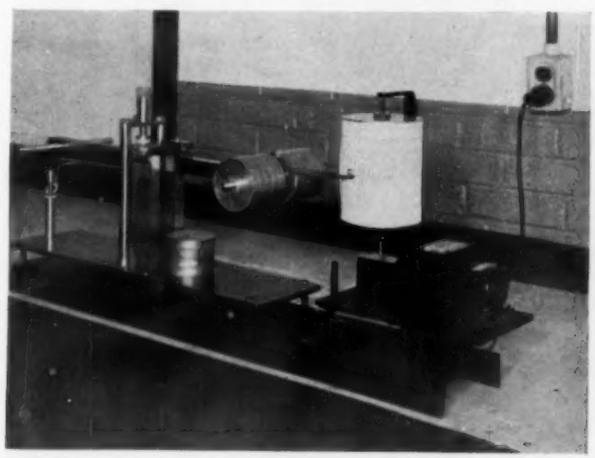
THE laboratories of practically all leading suppliers of rubber chemicals and compounding ingredients, as well as those of the larger rubber manufacturers, are generally comparable as to the equipment they contain. The literature is replete with articles describing these various laboratories in each of which is found equipment which to a large extent has become standardized for certain specific tests. Committee D-11 on Rubber Testing of the American Society of Testing Materials has greatly aided in such standardization. In each of these laboratories, however, will be found certain pieces of testing apparatus conceived and designed by its own engineers and technologists, and also modified versions of standard equipment. This is particularly true of the extensive rubber laboratories maintained at Deepwater, N. J., by E. I. du Pont de Nemours & Co., Inc. An attempt is made in the following illustrations and descriptive text to indicate the research value of the special and modified apparatus designed by DuPont's engineers.



UNIVERSAL AUTOCLAVE

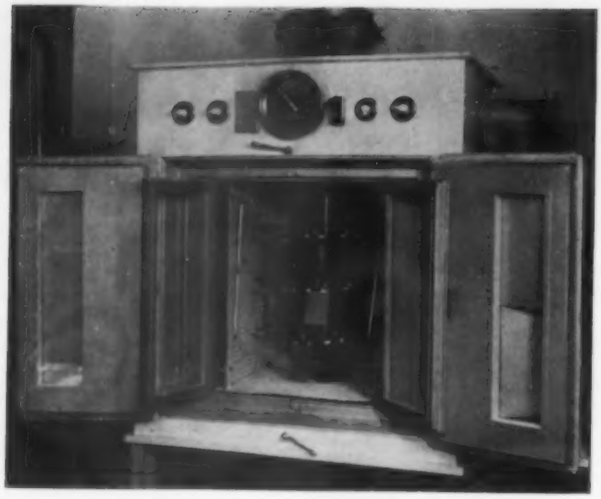
ONE OF THE MOST unusual of the special pieces of apparatus devised by DuPont engineers is this all-purpose autoclave which may be used for curing in water, steam, air, ammonia, nitrogen, carbon dioxide, etc., thus earning the term "universal." For instance, it is used for curing footwear compounds in air, air and steam, or ammonia at pressures up to 100 pounds per square inch; for curing extruded goods in pans in open steam or in soapstone; for curing high grade hard rubber stocks in water. In addition to its uses for vulcanization, the autoclave is adapted for conducting accelerated aging tests such as the air pressure heat test, the determination of heat resistance in the absence of oxygen by filling the chamber with inert gas, and others. It may also be used as an oven for conducting aging tests at atmospheric pressure at various temperatures.

The autoclave consists of a jacketed steel chamber, with an inside diameter of three feet and an inside length of four feet. An 18-inch circular fan draws air through a 6-inch suction line from the rear of the chamber and discharges it into the front through an annular ring just inside the door, insuring uniform temperature conditions throughout the chamber. The steam pressure in the jacket and the temperature and pressure inside the chamber are independently and automatically controlled so that it is possible to vulcanize rubber or neoprene compositions in water, air, steam or any other gas or gases at atmospheric or superatmospheric pressures at any temperature up to 320° F. In all, there are 78 control valves on the autoclave.



COMPRESSION OSCILLOGRAPH

THE EVALUATION OF COMPOUNDS for rubber springs is not complete unless information is available from a test simulating service load conditions. The improved compression oscillograph depicted above automatically plots a record of vibrations resulting from an impact load applied to a cylindrical test piece. From the record, it is possible to calculate the resilience and the dynamic modulus of the stock. The machine is also adaptable to the determination of the static load-compression relationships for a pellet and to the measurement of "drift" or "creep". A pen mounted on the heavy end of the lever traces a record on a revolving drum which is driven by a synchronous motor. In the illustration the pen is seen tracing a vertical line, the length of which indicates the amount of "drift" that has occurred in a test piece in a static test.



CONSTANT HIGH TEMPERATURE OVEN

ALL AGING OVENS used by DuPont are designed for specific purposes. The one illustrated above is a precision controlled high temperature oven used in evaluating the heat resistance of rubber or neoprene compounds exposed to high temperatures at atmospheric pressure. It is also used for other types of research or control tests where the maintenance of constant high temperature is of the utmost importance. Temperatures up to 200° C. may be obtained and may be maintained within 1.0° C. by means of a series of switches working in conjunction with a deKhotensky control, operating the heating elements which are located in the top of the oven.

Air is circulated over the heating elements by means of a blower, entering the oven through a perforated baffle plate at one side and returning to the blower through a similar plate at the opposite side of the oven. A uniform air flow is maintained by adjusting a series of vanes located behind each baffle plate. The test specimens are suspended vertically from a rack which rotates inside the oven, thus assuring a uniform heating of each specimen.

ABRASION RESISTANCE OF GLOVES

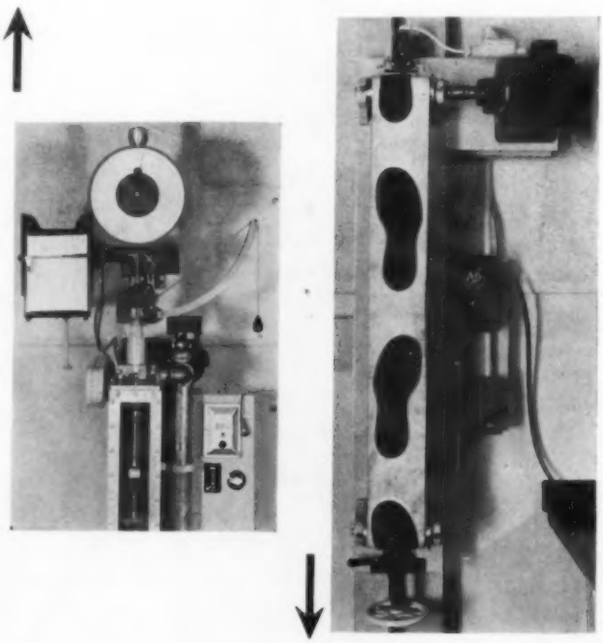
THIS MACHINE was specially designed and constructed to test the abrasion resistance of gloves. The conditions under which the tests are run are much more severe than service conditions, but are similar. The gloves are loaded with a definite weight and are pulled back and forth across an abrasive surface until they are worn through. Various abrasive materials are used in the test. The machine makes 37 strokes per minute, each stroke being 10 inches long. DuPont is currently working on another type of machine to be used in testing the wearing qualities of gloves in a swollen condition.

STRESS STRAIN AND TEAR DATA

THE JAWS of this apparatus, used to obtain stress strain and tear data at elevated temperatures, were specially constructed to hold samples without slipping. The illustration shows the upper section of the tank and the test machine head which is of the conventional Scott type. The machine is mounted in a shallow pit below the floor level allowing high elongation of the sample without raising the head above the normal testing machine height. At extreme elongations the bench marks on a normal test specimen can be viewed above the floor level.

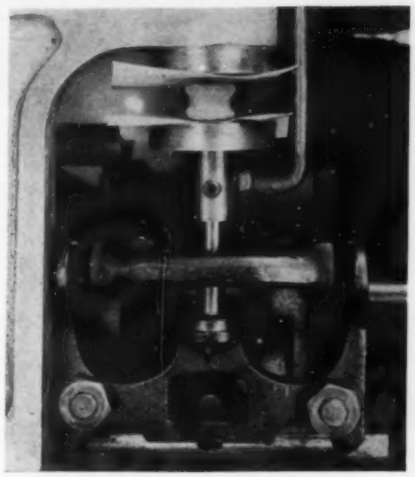
The lower jaw of the machine is motivated by means of stainless steel link chains, one on either side of the clamp. Prongs placed on the lower jaw engage the upper jaw keeping them separated and in a position above the tank for loading. This makes it unnecessary to handle the jaws when loading with a test specimen. The specimen is heated by means of a hot water bath enclosed within a stainless steel tank. The water is heated and assured by forcing circulation through the system, the temperature being adjustable by thermostatic control.

The device has an automatic timing control so that when the sample is started downward both jaws submerge in the heating bath. The machine stops for a predetermined time allowing the sample to reach the bath temperature and then automatically resumes its downward movement.



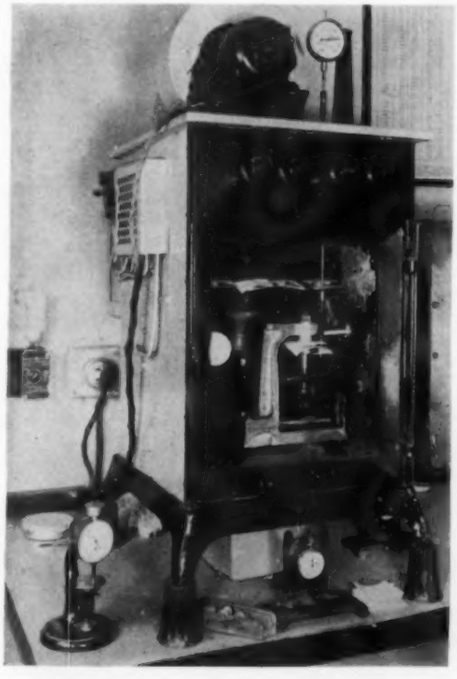
SOLE FLEXING APPARATUS

A MODIFICATION of the sole flexer developed by engineers of the Endicott Johnson Corporation, where it is being used with satisfactory results, the apparatus above is used by DuPont for testing the flex resistance of rubber or neoprene soles. It consists of a canvas belt, to which the specimens are sewed, travelling around two pulleys. The upper pulley is connected to a ½ h. p. motor, and the lower pulley is so arranged that the proper tension may be applied to the belt by means of the handwheel seen at the bottom of the illustration. The specimens are flexed 320 times per minute. In testing, the belt is run until failure of the specimens is indicated by the development of cracks at the stitches. The specimens are examined frequently throughout the length of the test. Should a specimen fail prematurely and break away from its stitches it strikes a tripper bar connected to a stop switch located above the upper pulley, thus stopping the travel of the belt.



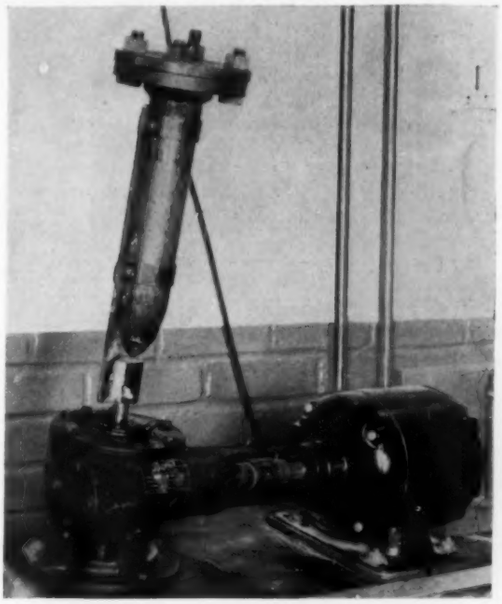
PLASTICITY APPARATUS

DuPont Measures the plasticity of rubber or of neoprene with this modified Williams' Plastometer. Five kilogram's pressure is applied against a plate by a lever and fulcrum mechanism. A test pellet, with a volume of 2.00 c. c., lies in the center of this plate. The applied pressure moves this plate against a fixed parallel plate. The entire apparatus is housed in an 80° C. hot air oven (see below). After the pellet is prepared for testing, it is placed between two small sheets of onion skin paper and is warmed for 15 minutes between two metal bars in the oven. The metal bars are intended to condition the pellet for the test by compressing it to a standard preliminary height of 0.400 inch while it is being heated to 80° C. If it does not respond to the conditioning treatment it is clamped by forceful means to insure proper conditioning compression.



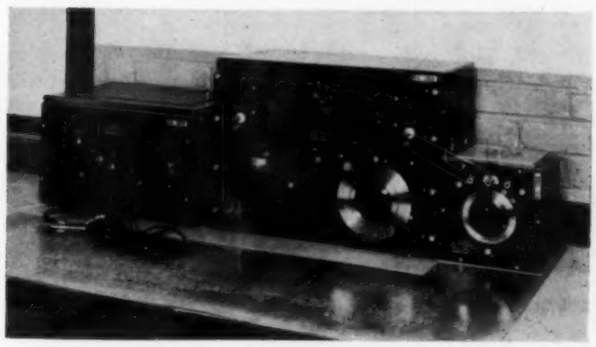
This Is The 80° C. hot air oven in which the modified Williams' Plastometer is located, as seen. A gauge is located at the top of the oven and is actuated by a rod which extends through the oven from the bottom plate of the plastometer. The gauge indicates in thousandths of an inch the height of the test pellet at any period during the test. Before starting the test, this gauge is checked to zero with two layers of the same paper that is used on either side of the pellet (see above). This is done by placing two layers of the paper between the parallel plates of the plastometer, applying the weight and setting the gauge to zero. The Randall-Stickney gauge is used in gauging the recovery of the sample, being calibrated in a like manner.

After the five kilogram's pressure is applied for three minutes the dial reading is recorded. This is called the "plasticity figure." Pressure is immediately released at the end of this three minute period and the pellet is removed from the oven. It is allowed to cool for one minute at room temperature after which it is gauged on the Randall-Stickney gauge. This reading is called the "recovery figure." The difference between the two "figures" is recorded as the "recovery." The entire test is run with a stop watch, shown in front of the oven above, and extreme care is taken in the timing and in the manipulation of the plastometer. Two pellets are used for each test. If the plasticity of the two pellets does not check within 0.003 inch, a third pellet is cut from the specially-prepared stock and is tested.



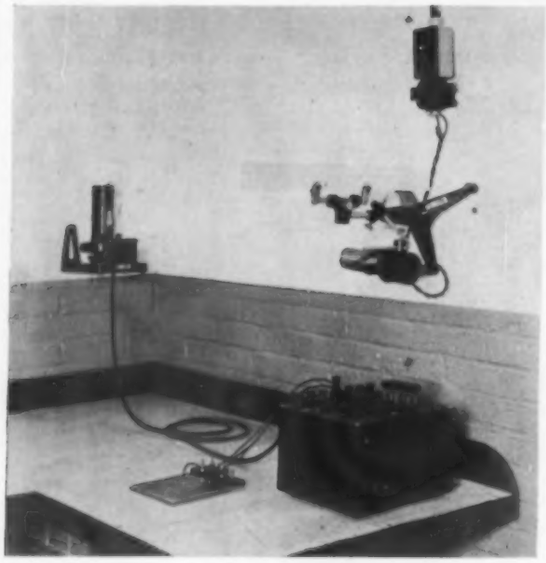
DETERMINATION OF LEACHING ACTION

Agitation Of Neoprene Specimens in liquid propane to determine the leaching action under pressure at room temperature is performed on this apparatus. The results gauged by this method are of special interest to engineers in the rubber consuming industries.



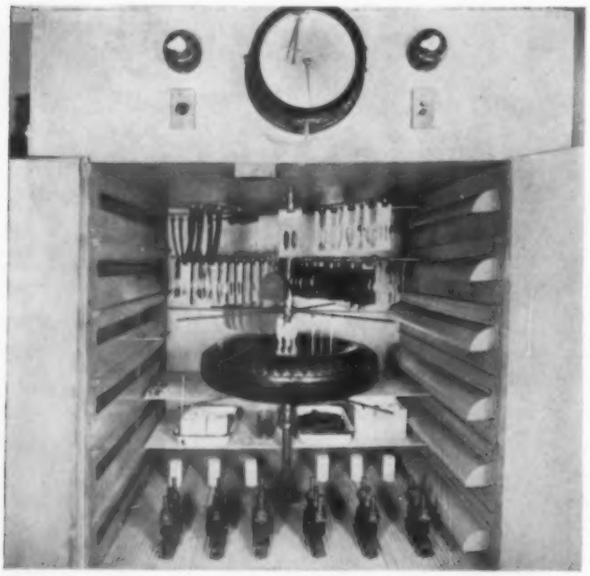
CAPACITANCE BRIDGE

This Capacitance Bridge in the electrical testing laboratory is used in determining the power factor and dielectric constant of insulating materials.



RESISTIVITY OF INSULATION

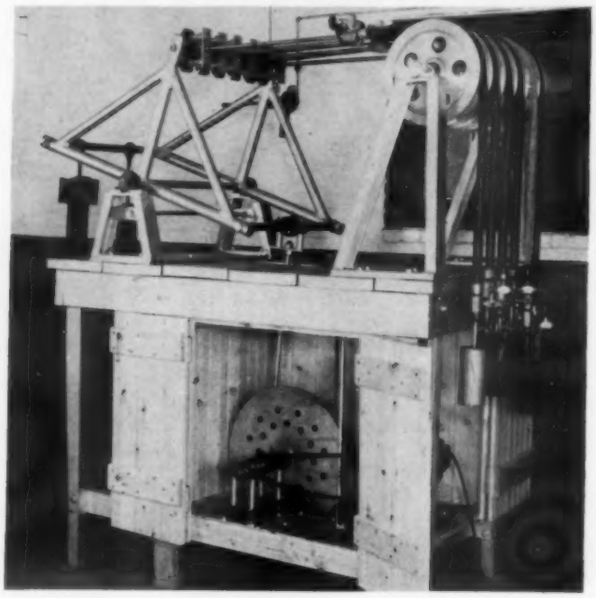
THE SET-UP SHOWN in the reproduction above is used for the determination of the direct current resistivity of insulation. The conventional galvanometer method is employed.



LARGE GEER OVEN

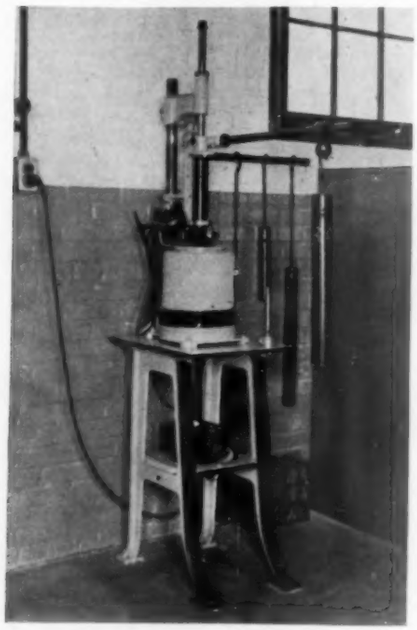
A VIEW OF THE interior of the largest oven used by DuPont. The oven, of the constant temperature type, which measures 48 inches in width, 47 inches in height and 45 inches in depth (inside dimensions), is used exclusively for 70° C. aging tests on rubber and neoprene compounds at atmospheric pressure. The oven is heated with circulating air, the air being forced over heating elements located in a compartment at the top, by means of two circulating air fans each powered with a ¼ h. p. motor. After passing over the heating elements, the air enters the oven through baffled vents in the right wall of the oven and returns to the circulating air fans through vents located in the opposite wall.

Constant temperature is maintained within the oven by means of a deKhotensky control which operates in conjunction with a series of switches. A recording thermometer provides a record of the oven's performance. The test specimens are suspended from the arms of a rack located in the center of the large oven. The rack rotates when the oven doors are closed, this action assuring a uniform heating of each specimen. Shelves are located in the lower portion of the oven providing additional space for aging plasticity pellets, for curing cup or plate films, for storing stocks for scorch tests, and for many other types of test.



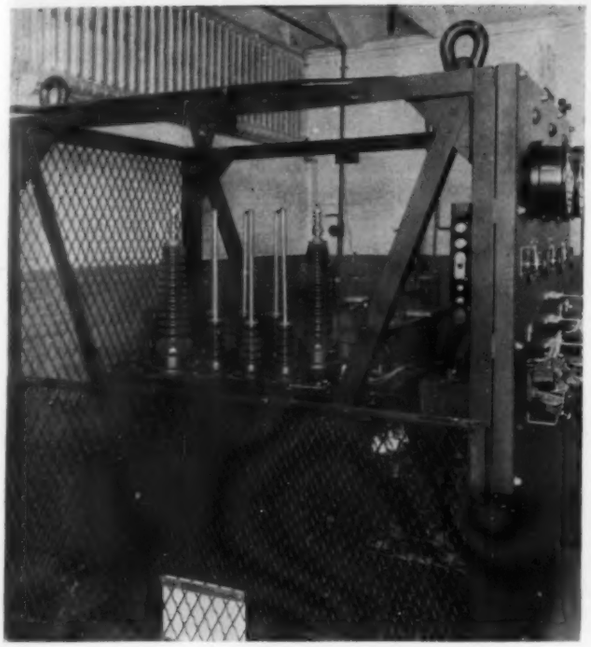
HOSE TESTING EQUIPMENT

THIS EQUIPMENT was designed to determine the influence of combined bending and stretching on commercial hose containing gasoline. A third factor, exposure to sunlight, is introduced by running the machine outdoors during the summer months.



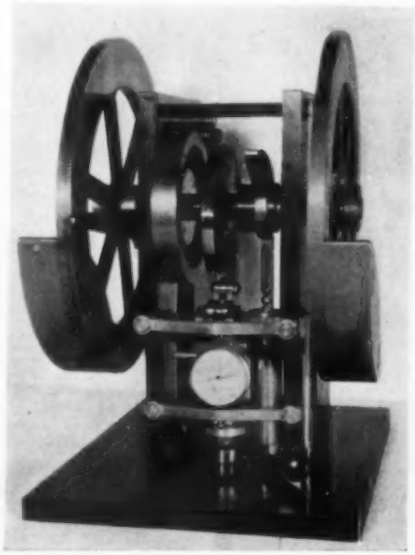
RUBBER-TO-METAL ADHESION

HERE IS THE special apparatus devised by DuPont engineers to evaluate the adhesion of rubber and neoprene to metals. The assembly shown includes an insulated glycerine bath surrounding the bed plate of an arbor press. This press arrangement is used in order to control the actual pressure on the vulcanizate during cure, thus subjecting to control a factor ordinarily left to chance in curing.



HIGH VOLTAGE EQUIPMENT

ONE OF THE LATEST additions to the network of DuPont testing facilities is the electrical testing laboratory. This illustration is a close-up of the high voltage equipment in the laboratory for tests of dielectric strength. Any potential between 250 and 50,000 volts is obtainable. In the background can be seen the tank for immersion of samples in water when required for a test.



WILLIAMS' PENDULUM PLASTOMETER

THE WILLIAMS' PENDULUM PLASTOMETER is designed to measure the amount of energy consumed in deforming an unvulcanized rubber specimen by compression and to measure the elastic recovery subsequent to compression. The elastic recovery following the rapid deformation is much greater than that obtained with the ordinary parallel-plate instrument. The actual measurement of .the energy consumed and elastic recovery requires less than 1 minute. Samples are brought to a uniform temperature by preheating for at least ten minutes at the temperature of the test.

1939 Rubber Red Book ADDENDA and ERRATA

To help you keep your copy of the 1939 RUBBER RED BOOK directory correct and up-to-date, this column will be published from time to time. Additional current information can be obtained regularly from the feature and news pages of each issue of THE RUBBER AGE.

Page

19 Transfer Bradstone Rubber Co. and Braley Midland Co., Inc. listings to page 20 following Bowling Green Rubber Co.

29 Change address of Elastic Milk Corp. to 1916 West Highland Ave. (also change on Page 125 under Milwaukee).

48 Change address of Mihm Rubber Co. to 1172 East Slauson Ave. (also change on Page 110 under Los Angeles).

50 Change name of National Adhesives Corp. to National Starch Products, Inc. (also correct this name on Pages 86; 112,Chicago, Ill.; 117, Dunnellen, N. J.; 120, New York City).

71 Omit Williamsburg Wire & Cable Corp. (also on Page 119); mail undeliverable.

205 Change Chiksan Oil Tool Co., Ltd., Fullerton, Calif., to Chiksan Tool Co., Brea, Calif. (also change on advertisement, Page 161; Advertising Index, Page 418; listing under "Joints", Page 160).

261 Add: BARDEN; rubber clay; J. M. Huber, Inc.

262 Add: COMPTON; rubber clay; United Clay Mines Corp.

262 Add: CHICORA; rubber clay; J. M. Huber, Inc.

274 Add to Binney & Smith Co. listing: Branch office in Cleveland; Sales Agents in Boston, Detroit, Los Angeles, St. Louis, San Francisco.

278 Add to United Carbon Co. listing: Agents in Boston, Trenton, Los Angeles, San Francisco, Montreal, Toronto.

294 Add under "R"; Rayon Processing Co. of R. I., 86 Tremont St., Central Falls, R. I.

302 Change F. W. Dunbar & Co. to J. F. Dunbar & Co.

305 Add to Naugatuck Chemical Div. listing: John E. Caskey, Factory Manager.

339 Change Edward Fox to Fox Laboratories, 17 West 3rd St., New York City. (also change name in Advertising Index, Pag 418).

342 Add under Boston: Binney & Smith Co.—Hird & Connor, Inc., 88 Broad St.

344 Add under Cleveland: Binney & Smith Co., 1400 Union Trust Bldg.

345 Add under Detroit: Binney & Smith Co.—C. W. Hess Co., 1900 E. Jefferson Blvd.

348 Add under St. Louis: Binney & Smith Co.—J. E. Niehaus & Co., 116 Mart Bldg.

349 Add under San Francisco: United Carbon Co.—L. H. Butcher Co., 15th & Vermont Sts.

350 Add: United Carbon Co.—Canadian Industries, Ltd., 1135 Beaver Hall Hill, Montreal; also 732 Bay St., Toronto.

370 Change address of W. L. Coates to McKinnon Iron Works, Ashtabula, Ohio.

418 Under "G"—third item—correct spelling is General Magnesite and Magnesia Co.

Copies of the 1939 RUBBER RED BOOK, published within the past month, are available at a cost of $4.00 for paper bound and $5.00 for cloth bound editions. This latest issue of the valuable biannual Directory of the Rubber Industry, contains considerably more data than did the first number, issued in 1937.

German Synthetic Rubber Manufacture

GERMANY claims to have achieved marked progress in effecting improvements in its newly established synthetic (Buna) rubber industry, enabling a lowering of production costs, improvement in quality of output, better processing qualities, decreased consumption of electric energy, shifts in raw material base, etc., all tending greatly to improve the industry's outlook in competition with natural rubber. The following data, taken from a report of the American Consul at Frankfort-on-Main, throws some light on these claims.

Electric Arc Process Developed

An outstanding development has been the recent perfection of a new electric-arc process enabling the manufacture of synthetic rubber by the conversion to acetylene of waste hydrocarbons produced by synthetic gasoline plants and thus dispensing with the need for carbide as basic raw material. The second large commercial plant for producing synthetic rubber, now building at Huls in Westphalia, will use this newer process, based upon waste hydrocarbons in lieu of carbide, the basic material used by the first plant, recently completed at Schkopau.

The cost of synthetic rubber is still high, being reported as around 3.00 marks per kilo. However, it is expected that further progress will be achieved which will enable a progressive reduction in cost and that ultimately the stage will be reached where the synthetic product will be fully competitive with the natural product.

It should be pointed out that even the present price difference does not reflect the relative economy of the synthetic and natural rubbers since synthetic rubber is said to be superior material, enabling manufacture of automobile tires of considerably longer life, owing to greater resistance to wear, oils, gasoline, etc., compared with tires of natural rubber.

A primary factor in the high cost of synthetic rubber heretofore has been the large amount of electric power, of around 40,000 k.w.h. per metric ton, required for its production. It is reported that due to technical improvements it will be possible considerably to reduce consumption of electric power.

When the manufacture of synthetic rubber was first started, serious difficulties were encountered by tire manufacturers in processing the new material owing to its brittleness and general unworkableness, and it was predicted that it would be necessary to enlarge the processing capacity of tire plants five-fold for handling the material. However, changes in composition of the synthetic rubber have completely overcome these initial difficulties and the material can now be processed as easily as natural crude rubber.

Buna "S" Is a Mixed Polymer

In continuation of research work, the leading type of Buna synthetic rubber was developed known as Type "S," a mixed polymer consisting of butadiene and styrene. Production of styrene was originally developed at the Ludwigshafen plant of the I. G. Farbenindustrie, A.G., but its production, along with the other necessary component, carbide, is carried on in the newly completed works at Schkopau. The two hydrocarbons are mixed in an emulsion, yielding so-called Buna "S" Latex. The final solid Buna rubber is produced in similar manner to production of natural rubber from natural latex, *i.e.*, by the addition of acetic acid.

The Buna synthetic rubber as formerly manufactured enabled manufacture of tires with only one life; that is, the rubber could not be reclaimed. This disadvantage has also been overcome by recent technical progress and it is now possible to reclaim synthetic rubber contained in wornout tires.

Most of the tires incorporating Buna rubber manufactured until now have included around 30% natural rubber. However, the outer tread has consisted entirely of Buna rubber owing to its greater resistance to wear compared with natural crude rubber. While for sometime at least natural rubber will be included with synthetic in the manufacture of tires, it is expected that as commercial output of synthetic rubber expands tires will be made upon an increasing scale of synthetic rubber without addition of natural rubber.

When the two synthetic rubber plants now in operation or building, at Schkopau and Huls, respectively, attain full production, it is anticipated that they will supply a very considerable share of Germany's large and steadily expanding consumption of rubber.

Synthetic Rubber from Sugar

IN the May, 1939, issue of THE RUBBER AGE, the possibility of manufacturing so-called synthetic rubber from ordinary sugar and turpentine, according to a patent issued by the U. S. Patent Office to Ernst Kleiber, was discussed. The patent disclosed that the sugar is first treated with a mixture of nitric acid and hydrochloric acid while being stirred mechanically for about 18 hours. Then turpentine is added and the mass is stirred until fully thickened. In the reaction that takes place, the molecules of saccharose and turpentine "polymerize" to form rubber-like compounds. The yield is said to be between 78 to 83% of the starting material.

According to information just received from the New Orleans (La.) Association of Commerce, this conversion process has been confirmed by experiments made on a Louisiana sugar plantation. Several batches have been made by A. R. Wurtele on the Ramsey Plantation, near New Roads, Louisiana. The batches are reported to exhibit all the properties of latex.

Louisiana's Potential Production

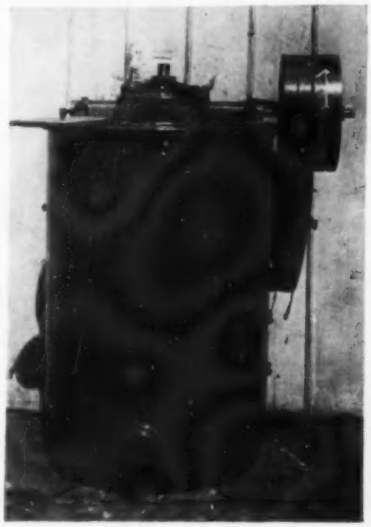
The Association points out that this new process may prove the salvation of the Louisiana sugar industry which is now operating at approximately half-capacity as a result of acreage quota limitations by the Government. Louisiana is now producing 400,000 tons of sugar annually, but could produce over 1,000,000 tons easily. If the Kleiber process proves commercially applicable, Louisiana could supply approximately 800,000 tons of so-called synthetic rubber annually.

It is also stressed that the processing of rubber from sugar and turpentine is simple and inexpensive. Louisiana produces everything that is needed to make this rubber: sugar, turpentine, the nitric and hydrochloric acids, and the neutralizing caustic soda. During 1938, the state had 270,000 acres under sugar cane cultivation. This acreage produced 5,859,000 tons of sugar cane from which was extracted 491,000 tons of sugar. By doubling these figures, an idea of the amount of sugar cane and sugar Louisiana can grow can easily be secured.

New Equipment

Gear Assembly for Cement Churns

A GEAR assembly and cover built in one compact unit to fit the standard 36-inch churn for mixing and agitating rubber cements and other types of liquids has been introduced by M. Norton & Co., Locust Street, Medford, Mass. The new unit, which does away with unsightly exposed gears and hangers, is com-



pletely enclosed and runs in oil, with worm drive and end thrust bearing providing for smooth, silent, long-lasting performance. Because friction is considerably reduced, the Norton assembly lessens the fire hazard. Another advantage is that it may be easily attached. The accompanying illustration shows a standard 200-gallon rubber cement churn equipped with the new gear assembly. The company is prepared to furnish complete equipment if desired.

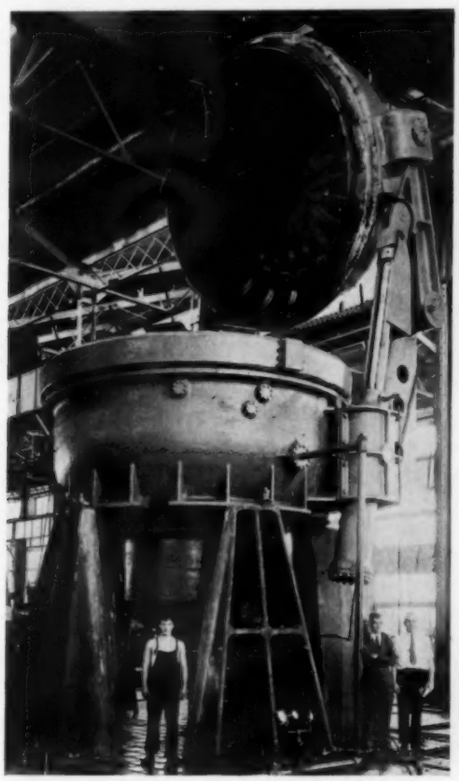
Qwik-Flate Valve Cap

DESIGNED to permit quick inflation of tires without removal of the cap from the valve, the Qwik-Flate Valve Cap has been developed by the Dill Manufacturing Co., Cleveland, Ohio, and is already being used as standard equipment by several tire manufacturers according to the producer. A ball type plunger built into the cap is depressed by the chuck on the air

line, releasing air directly through the cap to inflate the tire. Providing the combination advantages of an extra seal for prevention of mud, dust and water entering the tire valve and easier, quicker inflation, the new valve cap is said to enhance safety and convenience for the car owner and to save time for station attendants.

Giant Tire Curing Press

A GIANT vulcanizer, capable of curing tires up to approximately 10 feet in diameter, has recently been completed by the Baldwin-Southwark Corporation, Philadelphia, Penna. Standing 18 feet high with the lid closed, and 30 feet high with the lid open, the press, which has a clear inside diameter of 150 inches and a 5-foot high mold space, is believed to be the largest of its type ever built. When installed, however, only 7 feet 6 inches of the press will appear above the floor with the lid closed. Designed and built for the Firestone Tire & Rubber Company, the giant press has a ram 68 inches in diameter and a 40-inch stroke. Operating as it does at 1,000-pounds per square inch hydraulic pressure, the press is capable of exerting a 2,000-ton pressure on the molds, and with the 100-pound steam pressure inside, a total load of 2,500 tons



is exerted upon the lid locking device. The main ram is chromium-nickel-cast iron and operates in a bronze bushed cylinder. Two copper-lined lid lifting cylinders, with stainless steel piston rods, are operated with an equalizing mechanism. A hydraulic cylinder actuates the locking ring for securing the lid to the main shell during the processing period. A safety mechanism locks the lid when it is in the open position to prevent its dropping in the event of power failure. The lid lifted by this mechanism complete with top mold weighs over 115,000 pounds.

New Brown Instrument Line

AN entirely new and improved line of temperature and pressure recorders, indicators and controllers has been placed on the market by the Brown Instrument Co., Philadelphia, Penna. These instruments include thermometer indicating and recording types for temperatures from —40° F. up to 1200° F. and indi-

cating or recording pressure and vacuum gauges for ranges from 6 pounds of water up to 2,500 pounds per square inch and on vacuum ranges of 10 inches of mercury and over. All types are offered in one, two or three pen models. The flat, spiral actuating elements have ample pen torque without sacrificing speed of response. Especially heat-treated to insure permanent calibration, they are said to have excellent over-range capacity. A special safety link between actuating element and pen provides an overload safeguard protecting the mechanism from damage if the pen is moved in either direction manually. The chart is firmly secured to driving mechanism by tapered stud and tapered chart positioning stud, eliminating chart knob and chain. Charts, when renewed, are automatically in time, as the tapered position stud is in effect the hour hand of the electric clock. If current failure makes it necessary to reset chart to correct time line, a friction clutch permits manual rotation for chart setting.

Summit Tire Curing Presses

A NEW line of tire curing presses has been introduced by the Summit Mold & Machine Company, Akron, Ohio. They can be furnished in sizes from 40-inch to 75-inch single and 45-inch dual. The new presses, which are electrically operated, have no revolving cams, cranks or magnetic brakes to get out of time or adjust. They close through a worm gear unit direct to toggle and with the same pressure each time through a current relay. To open the presses, the motor is reversed. Simple in design and rigid in construction,

the Summit presses are convenient for the operator to load and unload. All bearings are Timken or bronze bushed and are easy to lubricate. Presses can be furnished with automatic mold shifting for stripping or ring stripping if desired. All of the presses are machined for either type. All types of presses can be furnished for jacketed molds, insert type molds, and steam platens or steam chambers for use with the conventional type pot heater molds. One of the single type presses is illustrated herewith.

Book Reviews

1939 Rubber Red Book—Directory of the Rubber Industry. Published by THE RUBBER AGE, 250 West 57th St., New York City. 6x9 in. 420 pp. $4.00 paper bound; $5.00 cloth bound.

With all former sections completely revised and widened in scope, plus the addition of four new sections, the latest edition of this Directory of the Rubber Industry should prove even more valuable to the trade than was the previous—and initial—issue, published in 1937. The four new sections are: (1) Sales Agents and Suppliers' Branch Offices; (2) Technical Journals; (3) Technical and Trade Organizations; and (4) Who's Who in the Rubber Industry.

Other sections, all of which contain more detailed information than the previous issue, include: Rubber Manufacturers in the United States; Rubber Manufacturers in Canada; Rubber Machinery and Equipment; Rubber Chemicals and Compounding Materials; Fabrics and Textiles; Crude Rubber; Reclaimed Rubber; Scrap Rubber Dealers; Miscellaneous Types of Rubber and Allied Materials; Rubber Latex; Miscellaneous Products; and Consulting Technologists.

Those sections which lend themselves to break-downs, such as rubber manufacturers, machinery, chemicals, fabrics, etc., are again handled in that manner. For instance, the rubber manufacturers section is divided into three parts, *i.e.*, an alphabetical list, a classified list of rubber products, and a geographical section. The chemical section consists of a classified list of materials, a trade and brand name division, and an alphabetical list of suppliers. The machinery and fabric sections are divided into classified and alphabetical lists.

One improvement which should prove important is the inclusion of an alphabetical subject index. Use of this index permits the user of the Directory to readily secure the exact type of information he is seeking.

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Handbook of Chemistry. (3rd Edition). Compiled and Edited by Norbert Adolph Lange. Published by Handbook Publishers, Inc., Sandusky, Ohio. 5⅜x7¾ in. 1850 pp. $6.00.

Although none of the tables in the previous editions of this handbook has been eliminated, a number of them have been entirely rewritten or extended to incorporate more recent information. In addition, several new tables are included for the first time, while more than 165 pages scattered throughout the text have undergone alterations. While these alterations are hardly noticeable, they are important in keeping the information supplied up-to-date. In an effort to make this newest edition self-explanatory, the section on definitions has been extended to include a definition of all column headings and technical terms used throughout the work. With this same thought in mind, the compiler has added a table of the commonly accepted thermo and physico-chemical symbols and a table of dimensional formulas. With these additions, the handbook should prove even more valuable than heretofore.

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Rayon and Staple Fiber Handbook. (3rd Edition). By Herbert R. Mauersberger and E. W. K. Schwartz. Published by the Rayon Handbook Co., 303 Fifth Ave., New York City. 5½x7¾ in. 832 pp. $4.50 in U. S. and Canada; $5.75 in foreign countries.

The amount of text matter in this third edition of the already well-known handbook doubles that of the first edition, published in 1934. Like previous numbers, the contents of the book are logically arranged and include a complete subject index. All branches of the industry are treated with in the 22 chapters, experts in the respective fields contributing to the text. A complete glossary of rayon terms is included for the first time as is a chapter on the manufacture of rayon staple fiber and spun rayon yarns. On the whole, the latest handbook serves as a complete, well-illustrated reference work on all phases of rayon production, manufacture and use.

Industrial Solvents. By Ibert Mellan. Published by Reinhold Publishing Corp., 330 West 42nd St., New York City. 6x9 in. 487 pp. $11.00.

This is the first thorough, authoritative, American book on solvents and their industrial uses. The author, whose experience embraces not only the manufacture of synthetic organics but the use of solvents in all the major fields of application, has succeeded in sifting and correlating into a coherent whole the extensive data on solvents which has been accumulating for some twenty-five years. Although the book covers theories of solvent action molecular aggregates and the implications for industry of evaporation rate, vapor pressure, boiling point and toxicity, its chief value will be as a practical reference book. All of the common solvents and many less familiar ones are classified and described in detail, with properties, peculiarities, uses and full technical data given in each instance. Some attention is paid to solvents especially suited for crude and chlorinated rubber, as well as the reclaiming of rubber with solvenol. The author also discusses the acetone-soluble components of crude rubber. There are 17 chapters, 118 tables, 291 charts, graphs and figures, and 14 halftones.

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Standard Chemical & Technical Dictionary. Compiled by H. Bennett. Published by the Chemical Publishing Co., Inc., 148 Lafayette St., New York City. 6x9 in. 638 pp. $10.00.

In addition to furnishing the definitions of more than 25,000 industrial products, pure chemicals, and trade names, this dictionary furnishes valuable information on the nomenclature of organic compounds, the prefix names of organic radicals, abbreviations and contractions, and the symbols used in mathematics, chemistry, pharmacy, etc. The definitions have been given concise rather than encyclopedic treatment. Data for given compounds appears in compact paragraph form with a complete listing of synonyms and cross references in each case. Another feature is the inclusion of a section giving the general rules for the pronunciation of chemical terms and a list of key words with their phonetic spelling and diacritical marks. This dictionary should find ready application in the chemical and related fields as a convenient reference manual.

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Medicolegal Phases of Occupational Diseases. By Dr. C. O. Sappington. Published by the Industrial Health Book Co., 540 N. Michigan Ave., Chicago, Ill. 5¾x7¾ in. 400 pp. $2.75.

This book presents, in handbook form, the industrial, insurance, medical and legal inter-relations of all the elements of occupational diseases, from origins and causes to disabilities and costs. Each phase is treated separately with stress placed upon the necessity of mutual cooperation for the solution of common problems. Each part consists of an introduction and chapter texts, followed by a summary and list of references. Throughout the text the author emphasizes the point that the cost of prevention of occupational diseases, in both large and small plants, is often appreciably less than the cost of defending a single occupational disease claim.

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In the Land of Rubber. By Melicent Humason Lee. Illustrated by Edmund Marine. Published by the Thomas Y. Crowell Co., 432 Fourth Ave., New York City. 6½x8¾ in. 99 pp. $1.75.

Written for children, this is the tale of two Malayan children, boy and girl, whose homes were on the edge of a rubber plantation and who worked with their families in cultivating rubber trees. The highlite of the story is a trip taken by the youngsters to a coastal town from where rubber is shipped and their experiences en route acquaint the reader with Malayan animal and vegetable life. A glossary of Malayan and technical words used in the book is given at the end. Children of members of the rubber industry should especially be given this book to read.

Booklets, Catalogs, etc.

Heel and Sole Compounding—Rubber, Isolac and Neoprene. (Report No. 39-5). By Alfred J. Northam. Rubber Chemicals Division, E. I. du Pont de Nemours & Co., Inc., Wilmington, Delaware. 6¼x9¼ in. 28 pp.

The entire subject of heel and sole compounding is presented in four parts in this report under the following headings: Conventional Rubber Heels and Soles; Isolac in Rubber Soles and Top Lifts; Natural and Colored Crepe Soles; and Neoprene Heels and Soles. Recommended formulas are given in each instance, with physical test data presented on most of the formulas. Advantages of various du Pont materials in these formulas are stressed. For the most part, recommendations given in this report are changed but little from those previously given by the company in its Laboratory Report No. 195, published in March, 1936.

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Green Book Buyers Directory—1939-40. Oil, Paint & Drug Publishing Co., Inc., 59 John St., New York City. 3¾ x 8 in. 940 pp. $1.00.

Valuable data on new and old basic materials, auxiliaries and reagents used in the chemical processing industries is contained in this latest buyer's guide, the twenty-seventh to make its appearance. The customary division of contents is continued in this edition, *i.e.,* Industrial Materials; Industrial Equipment, Containers, and Other Supplies; Professional, Technical and Commercial Services; Trade and Brand Names; Import and Export Statistics of the Principal Chemicals and Related Materials for the Years of 1937 and 1938. Listings of industrial materials are by the more commonly used names of the article.

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The Bullock Cart or the Tjikar as Road Destroyer. By A. Poldervaart. British Rubber Publicity Association, 19 Fenchurch St., London, E.C. 3, England. 5½ x 8½ in. 28 pp.

This latest booklet in the Rubber in Agriculture series issued by the British Rubber Publicity Association is a translation of an article which appeared in the August 20, 1938, issue of *De Bergcultures*, a Dutch trade journal. The author tells of damage done to roads in Java by bullock carts, which are called "tjikars" in East Java and "grobaks" in West Java, and then discusses the advantages of fitting these carts with rubber tires. The value of tires for other vehicles is also discussed.

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Accident Rates in the Rubber Industry—1938. National Safety Council, 20 North Wacker Drive, Chicago, Ill. 8½ x 11 in. 8 pp.

As indicated by its title, this booklet furnishes data on injuries in the rubber industry which occurred during 1938. It shows, among other things, the predominant causes of accidents reported and what companies made the best records. The experience of the rubber industry is compared with that of other industries. The report is based on data furnished by 38 plants, covering 51,023 employees and an exposure of 85,388,000 man-hours.

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Tag Celectray Pyrometers. (Catalog No. 1101 E). C. J. Tagliabue Mfg. Co., Park and Nostrand Avenues, Brooklyn, N. Y. 8½ x 11 in. 32 pp.

This latest catalog of the company's extensive line of pyrometers and resistance thermometers contains descriptions of a number of new instruments, including the following: Self-Balancing Indicating Controller, Recorder-Controller for Throttling Electric Heat, Two-Point Indicating Controller, and Cabinet Type Indicator. Specifications of each instrument are given. A number of illustrations showing actual industrial use of various instruments are included.

Editorial Comment

No Cause for Panic

THE outbreak of hostilities in Europe early this month resulted in trying days on the Commodity Exchange, the price for spot rubber advancing over seven cents within three trading days. Futures prices advanced the full maximum 200 points permitted by the Exchange in each trading session of these same days. There is little doubt that the increased demand, which brought about the higher prices, came from factory interests, panic-stricken with the fear that rubber supplies, which have been cut down considerably in recent months, would soon tighten up drastically. There is no cause for any such tremulation. Rubber supplies are adequate at present and such adequacy seems assured for a long time to come—war or no war.

It is to be suspected that the sudden rush of orders for spot and future rubber on the Exchange came from manufacturers who remembered the situation which existed in the early part of the last World War—the war to end all wars. It will be recalled that when Great Britain declared war against Germany in 1914 it instantly placed an embargo on all crude rubber. Since that nation was then in control of approximately 85 to 90% of all rubber cultivation, the effect of the embargo can well be appreciated. It was not until the middle of 1915, after a committee of American rubber manufacturers, with the knowledge and consent of this Government, visited London and pleaded the cause of the manufacturers in this country, that the embargo was lifted and shipment to our shores resumed. Thereafter, and for the duration of the war, a limited amount of rubber reached this country, each shipment being carefully allocated to the industry, first by the British Embassy, then by the Rubber Club of America, predecessor to the Rubber Manufacturers Association, and finally, after the United States joined the conflict, by the War Industries Board.

But this is not 1914. The picture has changed appreciably. No longer does Great Britain control 85 to 90% of rubber cultivation, although it is still the major factor. The Netherlands East Indies, in a dire emergency, could produce almost all of the rubber needed annually. And even if shipments should be curtailed considerably by both the English and the Dutch, the United States could still turn out its full quota of finished rubber products for several long years. The status of reclaimed rubber and the rapid advance in the production of the so-called synthetic rubbers in recent years is sufficient cause for this assurance.

But these are all conjectures. No such drastic picture has yet taken shape or form, and, based on recent activities, there is little possibility that it will. The commodity markets of the world have not been caught unawares, as they were in 1914. Trouble has been brewing for months and months with the result that these markets have provided for contingencies, have cushioned themselves against the shock of war, have prepared for all major difficulties.

One excellent indication of the calm with which the English have accepted the European conflict, which may be well worthy of consideration by those manufacturers who foresee a shortage of rubber, is the fact that despite war conditions it has definitely been decided that the barter deal between England and the United States, calling for the exchange of 600,000 bales of American coton for approximately 80,000 tons of rubber to be held in reserve for use in the event of war, will go through.

All, of course, is not peaches and cream. There is no doubt whatever that rubber will move into higher price channels, but reasonable channels. The outbreak of war—any war—instantly places a danger on shipping, and it is only natural that insurance rates covering freight shipments of any kind from countries involved in the conflict rise. According to word from Singapore, insurance rates covering rubber shipments have already gone up approximately 50%. But even an increase in insurance rates, plus a nominal increase in the price of commodities which always occurs in war time, will not bring the price of crude rubber into the same high channels that a run-away market does.

As to the probable effect the European conflict will have on the sale of rubber products in this country there is and can be no definite answer—only conjecture again. How long will the conflict last? Will Germany negotiate? Will America remain aloof? These are only a few of the many points to be taken into consideration and answerable only by the future. Should events follow those of 1914-18, then steady annual increases in sales should be recorded by almost every branch of the industry, particularly that supplying the automotive trade, for the duration of hostilities.

Rubber is a strategic material and plays an important role in war. If the conflict abroad continues, as it gives every indication of doing, then American rubber manufacturers will benefit through increasing sales. They should not, however, repeat the mistakes made in the last war, particularly to the too rapid expansion of production facilities to meet existing orders, a mistake which indirectly led to depressions of recent years.

CURRENT • NEWS of the Rubber Industry

SEPTEMBER, 1939

ADEQUATE SUPPLY OF RUBBER SEEN

The outbreak of hostilities in Europe early this month resulted in a flurry of purchasing of crude rubber on the floor of the Commodity Exchange in New York. On September 1, advances of 5 to 30 points between sales, the biggest advances recorded in the history of the Exchange, were the order of the day. At the close of the session, spot rubber was being quoted at 18.90 per pound as compared with 16.62 the previous day. The price of futures advanced 200 points, the maximum permitted in one day under Exchange rules. The London Exchange was closed down on September 1 and at this writing (September 7) is still closed although plans for its reopening have been made.

The hectic situation on the New York Commodity Exchange eased somewhat on Saturday, September 2, rumors of conciliation between the warring powers keeping the price down. The declarations of war by England and France, however, over the Labor Day week-end resulted in a "wild" market on Tuesday, September 5, the price of spot jumping to 24.00 by the end of the day and the price of futures reaching its 200-point maximum advance early in the trading session. Most of the bidding was done by rubber factories.

Exchange Facilitates Trading

In order to prevent a run-away market, and to facilitate trading, the Board of Governors of the Commodity Exchange, Inc., issued the following notice to its members on September 6: "Until further notice, whenever the maximum prices are bid or minimum prices are offered on any commodity, trading direct between members shall be suspended and orders will be entrusted to the floor superintendent, under the direction of the floor committee which will give preference to earliest orders.

"Buying orders at maximum prices and selling orders at minimum prices must be entered in writing, which writing shall include the name of the member of the Clearing House Association who will clear the contracts, and no such order may be canceled except upon such notice as the floor committee may deem necessary."

This order was put into effect early on September 6 and as soon as limits were reached the allotment system provided for in the order was employed by rubber traders with the result that the market began to ease and, except for a few short flurries during the day, moved steadily lower, closing at 21.50. There were many rumors as to the adequacy of rubber supplies, but the order apparently served to steady the market.

In order to disperse widespread fears regarding rubber supplies in the United States, the Rubber Manufacturers Association sent the following telegram to every rubber manufacturer in this country on September 6:

"Commodity markets today apparently influenced by unusual and unnecessary fear regarding future difficulties. With respect to crude rubber market advices from reliable sources indicate adequate supply will continue to be shipped. Estimated shipments now en route this country probably exceed 50,000 tons.

"There is substantial evidence that adequate shipping will be provided regardless of adjustment of routes and lines including expressed policy of the United States Maritime Commission to give aid if necessary. Unfortunate if rubber manufacturers because of unwarranted fear contribute to present hysterical activity commodity markets."

Barter Deal Going Through

As for the status of the barter deal between England and the United States, calling for the exchange of cotton for rubber, it seems definite at this point that the deal will be consummated. A proclamation of the agreement was issued by President Roosevelt on September 6. The agreement was signed in London on June 23.

Current Outlook

The tire and rubber industry is recording the sharpest sales expansion in its recent history this year, according to the latest survey of the Poor's Publishing Co. Organizations with a large original equipment business are reporting the widest gains, but peak car registrations and usage will be of substantial benefit to companies selling only in the replacement field. Material costs on the average will be higher than in 1938, according to the report, but profit margins should be maintained because increased plant activity reduces unit overhead costs. The increased level of general industrial activity is said to be stimulating mechanical goods sales.

PROGRAM COMPLETED FOR SAFETY SESSION

The Rubber Section of the National Safety Council, headed by R. A. Bullock of the Corduroy Rubber Company as general chairman and R. W. Morse of the Firestone Tire & Rubber Company as vice-chairman, has completed its program for the 28th National Safety Congress which will be held in Atlantic City, N. J., from October 16 to 20, inclusive. As usual, an exhibition of safety apparatus will be held in conjunction with the Congress.

The Rubber Section will hold two sessions, on Tuesday and Wednesday afternoons, October 17 and 18, both in Room No. 3 on the second floor of the Atlantic City Auditorium, one of the largest of its kind in the world. In addition to a number of papers, the sessions will witness the presentation of safety awards and the election of officers for the 1939-40 season. Reports of various committees will be presented at the beginning of the first session.

List of Scheduled Papers

Papers scheduled for presentation at the October 17th session, together with their authors and company connections, follow: Carbon Tetrachloride in the Rubber Industry, by H. A. Walker (Goodyear); Progress of Safety in the Rubber Industry, by Ernest W. Beck (U. S. Rubber); Symposium on Prevention of Accidents in the Rubber Industry—Handling Materials, by D. G. Welch (Hewitt Rubber), Falls, by R. M. Weimer (Dayton Rubber), and Knife Cuts, by A. M. Dietz (Pennsylvania Rubber); Outstanding Facts of the Rubber Section Safety Contest of 1938-39, by Roland Kastell (U. S. Rubber).

The following papers are scheduled for the October 18th session: Safety and Product Quality in a Chemical Industry, by Dr. William G. Nelson (U. S. Rubber); Dust in the Rubber Industry, by Dr. P. A. Davis (Goodyear); Training Supervision in Aceident Prevention in the Rubber Industry, by John J. Loge (General Tire); and Safety Kinks, by R. S. Farnum (U. S. Rubber). As in the past, discussion will be held on each paper immediately after its presentation. Among those scheduled to lead discussions are C. W. Ufford (Ohio Rubber), J. T. Kidney (Goodyear), and William Spanton (American Hard Rubber.) Oliver Hopkins (U. S. Rubber) is current secretary of the Rubber Section.

MARKETING EFFORTS PUSH PLIOFILM SALES

Seldom has any material received the marketing cooperation which is rapidly being built up around Pliofilm, the rubber hydrochloride developed by the Goodyear Tire & Rubber Co., Akron. This month, for instance, the Butterick Company, nationally-known makers of patterns, is introducing a complete line of tissue-paper patterns to be used in making such articles as clothing bags, bowl covers and raincapes from the rubber company's transparent sheet.

Cooperating with the Butterick Company will be the Dennison Manufacturing Co., which will distribute the material through its host of stores, and the firm of Richards, Boggs & King, the distributors who played a large role in the early history of Pliofilm, and who will now distribute the sheet material through department stores and stationery stores in handy size rolls and sheets.

Pliofilm can be sewn with thread or sealed with electrically-heated sealing irons, and therefore the Singer Sewing Machine Company has started giving special sewing instructions through their many sewing centers throughout the country, while the Handicraft Division of the Burgess Battery Company is stressing the ease of fabrication with its "Sealcraft" sealing iron.

New uses for the Goodyear material are found almost daily. As an example, the recently perfected "Flav-O-Tainer" package introduced by the Thomas Royal Company, noted bag manufacturers, consists of a heat-sealed Pliofilm inner bag and a protecting outside paper bag. Tests are said to indicate that this package will keep coffee almost as fresh as vacuum packing. The same package may be used for smoking tobacco.

In 1935 Goodyear put its first master production unit on Pliofilm into operation, ran it two shifts a day, and turned out a total of approximately 1,428,000 yards of the material. Since then three additional units have been installed and all four units are reported to be working four shifts a day. It is estimated that an annual volume of 25,500,000 yards will be reached by the end of the current year. Standard thicknesses of Pliofilm range from 0.001 to 0.0025 inch with colors ranging from crystal clear transparent through twenty transparent colors to colored and metallic opaques. Present practice is to supply the material in 40-inch rolls which can be slit to any lesser width.

Controlastic Shoe Cloth

The Firestone Rubber & Latex Products Co., Fall River, Mass., has announced the availability of elastic shoe cloths of Controlastic, the multi-ply elastic yarn. The new elastic cloths are said to result in stretchable shoes having extremely glove-like fit. The multi-ply construction feature of Controlastic is due to the fact that every strand is made from 3 to 5 wrapped layers of rubber.

Rubber Bands for Buds

Approximately 6,000,000 highly specialized rubber bands have been used monthly by growers in California during the current year's rose and citrus budding season in preference to the more orthodox raffia ties. Each band is a strip of rubber 4 inches long and 3/16ths of an inch wide and is wrapped around the bud holding it firmly yet gently to the stem to which it is grafted. The rubber is so compounded that the sun's light and heat will disintegrate it in about 30 days. Similar bands are beginning to be used for budding peaches and avocadoes. The Rubber Band Service Company, Glendale, Calif., is one of the largest distributors of the special bands.

Issue Engineering Reprint

Due to the demand for the booklet "Rubber in Chemical Engineering," originally issued by the Rubber Growers' Association of England in 1933, a reprint has been made available by the British Rubber Publicity Association, the organization which has taken over the activities of the R.G.A. insofar as propaganda and publicity for rubber products and the developments of new uses for the raw material itself is concerned. The booklet, prepared by Henry P. Stevens and M. B. Donald, treats with the properties and chemical resistance of rubber, rubber linings for tanks and similar equipment, rubber paints, cements, etc. Copies of the new reprint are available without cost on request to the Secretary, British Rubber Publicity Association, 19 Fenchurch St., London, E.C. 3, England.

Fire at Lowenthal Plant

A spectacular fire practically destroyed the warehouse of the Loewenthal Company, scrap rubber dealer, on Elinor Avenue in East Akron, Ohio, on August 14, causing damage estimated at approximately $10,000. The fire was believed due to spontaneous combustion, the piles of scrap rubber going quickly up into smoke. It was the second major fire loss sustained by Loewenthal in recent years, flames having damaged its storage plant on Clewell Street in Akron some time back. The company maintains headquarters in Chicago.

Largest Hose Order

Hewitt Rubber Corp., Buffalo, N. Y., is reported to have recently received the largest fire hose order ever placed in the American market by the British Government. The order involves 675,000 feet of 2½-inch hose to be used in the British air raid precaution program, popularly referred to in England as the A.R.P.

CARBON BLACK SALES DECLINED IN 1938

Domestic sales of carbon black declined 20% in 1938 as compared with the previous year, according to a report recently issued by the Bureau of Mines of the Department of Interior, Washington, D. C. Exports declined 9% in the same comparison. Although production was curtailed at most carbon black plants, stocks are reported to have increased substantially.

Total carbon black produced in 1938 by 24 producers operating 55 plants amounted to 477,039,000 pounds, as compared with 510,606,000 pounds in the previous year. Of these amounts 441,284,000 and 444,427,000 pounds, respectively, were produced by the channel process and the balances by other processes, such as roller and thermatomic.

There were 324,950,000,000 cubic feet of natural gas burned at carbon black plants in 1938, compared with 341,085,000,000 in 1937. The average yield of carbon black per thousand cubic feet of gas burned was 1.47 pounds last year as compared with 1.50 pounds in the preceding year. The decline in average yield was attributed to the decline in activity of processes other than the channel process, since some of these other processes are said to be capable of yielding greater quantities of carbon black.

Of the domestic sales of carbon black of 243,474,000 pounds, the rubber industry took 217,231,000 pounds, or 89%, the ink industry took 14,131,000, or 6%, the paint industry 4,229,000 pounds, or 2%, and all other industries absorbed 7,883,000 pounds, or 3%. These figures indicate that sales to the rubber industry are increasing slightly at the expense of sales for miscellaneous purposes.

Acquire Bakelite Corp.

The board of directors of the Union Carbide and Carbon Corporation, at a meeting held on August 29 in New York City, approved an agreement for the acquisition by that company of all of the assets of the Bakelite Corporation. Under the agreement there will be distributed to Bakelite stockholders 187,500 shares of Carbide common stock exchanged for Bakelite's assets. Bakelite preferred shareholders will be entitled to receive for each preferred share 1¼ shares of Carbide stock, the remainder of the Carbide stock to be divided ratably among the Bakelite common stockholders. The agreement becomes effective upon ratification by the holders of each class of Bakelite stock.

Changes Corporate Name

The National Adhesives Corporation, New York City, manufacturers of latex and other adhesives, is changing its name to National Starch Products, Inc. The personnel of the company remains unchanged. The firm has purchased the Piel Bros. Starch Company of Indianapolis and will operate it as a division.

LABOR TROUBLES AGAIN BESET TRADE

The past month has witnessed a return of labor troubles to the rubber industry, with several disputes assuming serious proportions. The Barr Rubber Products Co., Sandusky, Onio, the Sun Rubber Co., Barberton, Ohio, and the Marathon Rubber Products Co., Wausau, Wisconsin, were among the companies affected.

Barr Rubber Plant Reopened

The Barr Rubber plant was reopened on August 30, after having been shut for nine weeks, although no settlement had been reached with striking workers. According to Randolph J. Dorn, president of the company, the plant was reopened to permit entrance to "those who desire to return to work." Mr. Dorn said that the company agreed to an increase in minimum rates of pay but could not accede to the union's demand for a general wage increase. This demand is stated to be the only point remaining in dispute.

Reopening of the Barr Rubber Plant resulted in some disorder, the cars of several workers being stoned and two pickets being arrested. The plant, which manufactures balloons, toys and novelties, and which was organized sixteen years ago, normally employs between 200 and 250 workers, about two-thirds of them women. Later: The strike was settled on September 7.

The plant of the Sun Rubber Company at Barberton, Ohio, is shut at this writing, with approximately 500 workers idle. According to H. D. Dawson, international representative of the United Rubber Workers of America, the union recently requested a "workable seniority plan," an increase in base rates, and a union or preferential shop, and although a strike at the plant was voted late in August, it was withheld pending negotiations until the company made an effort to send out materials and records by truck on September 1st. A picket line was immediately placed around the plant.

Arbitration for Marathon

The labor difficulties of the Marathon Rubber Products Company at Wausau, Wis., seemed to be alleviated when workers, who had walked out of the plant on August 7, voted on August 31 to settle the dispute by arbitration. At this writing the plant is still closed, pending the appointment of arbitrators. Reason for the walk-out, according to union leaders, was discrimination against union workers and a refusal of the company to arbitrate. Marathon manufactures rubber raincoats and sportswear, and normally employs approximately 300.

Incidentally, the U.R.W.A. was scheduled to hold its annual convention in La Crosse, Wisconsin, on September 10 to 15. Several hundred delegates were expected to attend the meeting, one feature of which was to have been a tour through the La Crosse Rubber Mills, makers of rubber footwear.

Coming Events

Oct. 3. Los Angeles Group, Rubber Division, A.C.S., Mayfair Hotel, Los Angeles.

Oct. 9-11. Annual Convention, N. A. I. T. D., Sir Francis Drake Hotel, San Francisco.

Oct. 15. 40th National Automobile Show, Grand Central Palace, N. Y.

Oct. 15-17. Nat'l Ass'n of Waste Material Dealers, Fall Convention, Baltimore, Md.

Oct. 17-18. Rubber Section, National Safety Council, Auditorium, Atlantic City, N. J.

Nov. 3-4. Motion and Time Study Clinic, Auspices of Industrial Management Society, Medinah Club, Chicago.

Nov. 15-17. American Institute of Chemical Engineers, Providence - Biltmore Hotel, Providence, R. I.

Dec. 4-9. 17th Exposition of Chemical Industries, Grand Central Palace, N. Y. C.

Specification Revision

The Federal Specifications Executive Committee of the National Bureau of Standards, Washington, D. C., has prepared a proposed revision of the Federal Specification for Rubber Goods (ZZ-R-601). The general specifications of this guide cover methods of physical tests and chemical analyses. The present draft of the specification is intended for comment only and suggestions received from all sources will be given careful consideration. Actual revision will not be made until government purchasing agencies, rubber manufacturers and other interested sources have had full opportunity to express opinions and furnish any recommendations they may wish to make. Copies of the proposed revision may be secured on request to the National Bureau of Standards. P. L. Wormeley is chairman of the Rubber Products Committee of the Federal Specifications Executive Committee. The present specification has been in effect since 1930.

Starts Fox Laboratories

Edward Fox, formerly associated with the Cementex Co., Inc., has formed the Fox Laboratories, 17 West 3rd Street, New York City, and is offering a line of non-inflammable latex cements and adhesives. The new company also supplies latex compounds for the rubber trade.

Copies of the 1939 RUBBER RED BOOK are now available. Price: $4.00 for paper bound and $5.00 for cloth bound editions.

GOVERNMENT ASKED TO CURB PRICE CUTS

One result of the latest tire sales launched by several leading manufacturers, offering discounts of 25% on first, second, third and fourth line passenger car tires, has been a request to the Department of Justice to extend its help in curbing price cuts in the industry. The request was made by Sherman H. Dalrymple, international president of the United Rubber Workers of America. It is believed that Mr. Dalrymple asked the anti-trust division of the Department to take action on the ground that there had been a collusive agreement on the price cut move.

Like the July 4 sale, which resulted in charges of "misleading" and "fraudulent" advertising, the current cuts were started by Goodyear, Goodrich and Firestone, with the rest of the trade generally following suit. Although the union executive branded the sales as a "tire price war," tire company officials insisted that it was merely a sale to stimulate business before the Labor Day week-end. In some circles, however, it was stated that the move was aimed against chains, oil companies and mail-order houses selling private-brand tires. These houses accounted for 27.4% of all replacement tire sales last year.

No indication was made as to what action, if any, may be taken by the Department of Justice on the claims and charges advanced by Mr. Dalrymple. It is understood that the union executive claimed that the "special sales" held this summer actually constituted a price war which may bring ruin to smaller manufacturers. He also expressed the fear that the cuts may eventually "come out of labor's hide."

INDUSTRY'S PAYROLL SHOWS IMPROVEMENT

Employment and payrolls in the rubber industry showed a far greater improvement in May over the same month in the previous year than was demonstrated by domestic manufacturing industries as a whole, according to a recent issue of the *Rubber News Letter* issued by the Leather & Rubber Division of the Bureau of Foreign & Domestic Commerce, Washington, D. C.

For all rubber products, the employment index figure was 81.2 in May, compared with 71.4 a year ago, an improvement of 13.7%. In all industries, the index was 90.1, compared with 83.4 a year ago, an increase of only 8%. The index is based on 100 as the three-year average from 1923 to 1925. The tire and tube branch of the industry showed an 11.1% gain, footwear 14%, and all other 16.7%.

Payrolls showed an even greater gain. For all rubber products the index was 82.1 in May, compared with 63.3 a year ago, an increase of 29.7%. All industries showed an index of 84.4, a 15.8% gain. Tires and tubes showed a 31% gain, footwear 29%, and all other 27.6%.

Names in the News

DR. EMIL OTT, associated with the Hercules Powder Co., Wilmington, Delaware, for a number of years, has been appointed director of research for the company. In his new position he will work closely with those consuming industries which can utilize the facilities of the Hercules Experiment Station. O. A. PICKETT continues as director of the station.

J. W. SHIELDS, former manager of farm tire sales for the U. S. Tire Dealers Corp., New York City, was recently transferred to the Detroit Plant of U. S. Rubber where he will engage in product development work in connection with farm tires.

GEORGE JATINEN, formerly associated with H. Muehlstein & Co., Inc., is now connected with the Boston office of A. Schulman, Inc., crude, scrap and hard rubber dust dealers of Akron. D. LUNDQUIST is manager of the office.

SAMUEL B. ROBERTSON, president, B. F. Goodrich Co., Akron, headed the list of fifty-one employees who completed 20 years of service with the company last month.

JOHN F. SCHAEFER, president, Master Tire & Rubber Co., Findlay, Ohio, addressed a meeting of the Kiwanis Club at Findlay on August 16. He outlined some of the changes that have taken place in the production of rubber goods since the discovery of vulcanization in 1839.

JOHN A. MACMILLAN, chairman of the board, Dayton Rubber Mfg. Co., Dayton, Ohio, returned from an extended trip to Europe on August 24. He combined business with pleasure during his trip.

JAMES W. YOUNG, noted advertising executive from Chicago, was named director of the Bureau of Foreign & Domestic Commerce of the United States Department of Commerce last month. He succeeds ALEXANDER V. DYE who was recently appointed American commercial attaché at London, England.

GLENN B. HALLER, associated with the Eagle Rubber Co., Ashland, Ohio, for more than twenty years, many of them in the capacity of credit manager, resigned from that company last month. He is entering the real estate and business investment field.

FRED A. NIED, superintendent of the Los Angeles plant of the B. F. Goodrich Company, has been transferred to Yokohama, Japan, where he will act in a technical advisory capacity for the Yokohama Rubber Co., Ltd. He has been associated with Goodrich for 31 years.

W. J. NUGENT, a veteran employee of the Gillette Rubber Company, who has served for many years as department manager, was recently appointed sales manager of the company succeeding CLYDE S. VAN GORDON, retired. The latter was associated with Gillette for fourteen years before his retirement.

COL. M. E. LYONS, president-treasurer, J. H. Day Company, manufacturers of rubber and other machinery of Cincinnati, Ohio, was given an honorary life membership in the Ohio Mechanics Institute of Cincinnati recently because of "long and devoted service to the cause of trade education."

K. H. STUBENVOLL, chief chemist, Gillette Rubber Co., Eau Claire, Wis., addressed a meeting of the Kiwanis Club at Chippewa Falls, Wis., on August 16. Discussing "Tires and Tubes," he said that Gillette will manufacture approximately 2,700,000 automobile tires, 3,200,000 inner tubes, and 800,000 bicycle tires this year.

MARTIN K. MOORE, associated with the Goodyear Tire & Rubber Co., Akron, in executive positions for the past 21 years, has resigned his post as manager of the petroleum sales division. He intends to reside permanently in St. Petersburg, Florida.

WALTER P. CAHILL, general superintendent and member of the directorate of the firm of Graton & Knight, Worcester, Mass., resigned from the company last month. He had been associated with the firm for approximately twenty years.

Carbon Black Substitute

An Osaka, Japan, firm is said to be now marketing a carbon black substitute which is made from pulverized lignite mixed with from 10 to 20% of natural carbon black. An analysis made of the product by a Japanese laboratory shows that the product contains 3.6% water, 40.2% carbon, and 54.2% silicate and other matter. It is reported that despite the presence of impurities, the new substitute is being used in the manufacture of rubber and other products.

Competition Nears Close

September 23 marks the closing of the Fourth Annual Plastics Competition sponsored by *Modern Plastics Magazine*, 122 East 42nd Street, New York City. Entries already received indicate that the current competition will be the largest held to date, not only insofar as the actual number of entries are concerned, but also in a wide variety of plastic applications. Details of the contest can be secured from the sponsor.

Ruling May Set Precedent

The decision on the anti-trust suit brought by the Department of Justice against 18 tire manufacturers involving allegations of identical bids to the Government for its tire requirements, which has been argued in the District Court in New York, is expected to set an important precedent as to Federal action on alleged collusive bidding. A defense motion is pending to dismiss the suit on the grounds that the Sherman Act never intended the Federal Government to sue for treble damages, as was done in this instance. Denial of the motion would be the signal for the Department of Justice to file suits alleging collusive bidding against manufacturers in several other industries.

Pigment Sales in 1938

Sales of lead and zinc pigments in the United States during 1938 were on the whole considerably under totals for the previous year, according to the Bureau of Mines, Washington, D. C. Of 68,711 short tons of litharge sold, 880 tons went to the rubber industry as compared with 1,659 out of a total of 83,902 in the preceding year. Sales of other pigments to the rubber industry in 1938, and the grand total of each, follow: Basic lead sulfate, 91 short tons out of 5,801; lithopone, 3,148 short tons out of 125,746; zinc oxide, 46,226 short tons out of 79,129; and leaded zinc oxide, approximately 5 short tons out of 38,216.

Auto Show Progress

Work on the display for the National Automobile Show, which will be held at the Grand Central Palace in New York City from October 15 to 22, inclusive, is progressing rapidly, and the growing list of exhibitors indicates that this year's exhibition, the 40th anniversary, will be truly representative of the motor industry in all its phases. Many of the exhibits will be dramatized and in action, affording visitors the opportunity to learn how the important parts of a car function. As usual, the show will be under the auspices of the Automobile Manufacturers Association, 366 Madison Avenue, New York City.

Kraft-Ply Packaging

A new company has been registered in Norway under the name of Norway Latex-Kraft, A.S., with a joint-stock capital of 200,000 kroner (approximately $45,000). The new concern will manufacture a packing material which is a combination of latex and kraft paper, described as kraft-ply, which is reported to have unusual resistance to heat and humidity. It is already in use as a packaging material for soap and fish.

Move Executive Offices

The executive sales offices of the Columbia Alkali Corporation have been changed from Barberton, Ohio, site of the plant, to 30 Rockefeller Plaza in New York City. No changes in personnel were announced.

SEE RECORD CROWD AT CHEMICAL EXPOSITION

Over forty industries producing materials and equipment will display their latest products at the Seventeenth Exposition of Chemical Industries for which nearly 300 exhibitors have already engaged space to occupy three floors of Grand Central Palace, New York. The Exposition, now marking its 25th year of service to the chemical industries, will be held during the week of December 4 to 9, 1939. A record attendance drawn from all over the world is expected. At the last exposition held in 1937, visitors came from 45 states in the United States and from 130 cities and towns in 47 foreign countries.

Chemicals and chemical raw materials constitute an important section of the Exposition and advance indications are that many of this year's exhibits will be significant in showing the effects of American research methods continuously applied. One exhibitor will feature hydroxylamine hydrochloride assaying 98% and better. This type of chemical is representative of a group which in the past has been largely imported or difficult to find in the American market. Its importance rests in its use in numerous organic reactions.

Other reagent chemicals shown by the same exhibitor will include amorphous boron, boron nitride, phenylhydrazine hydrochloride, dimethyl glyoxime, hydroxylamine sulphate, semicarbizide hydrochloride, phenylmethyl pyrazalone, butyl bromide, hydrazine sulphate. Additional reagent chemicals will include those in liquid and gaseous form. A total of 29 gases will be demonstrated by one exhibitor, also cylinders, valves, gauges, and controls for handling them in the laboratory.

Extensive Glycerine Exhibit

Glycerine as a basic chemical raw material will be exhibited in terms of its many applications in the manufacture of foods, cosmetics, pharmaceuticals, textiles, rubber, leather goods, and plastics. The same display will illustrate sources of fats and oils used in the manufacture of soap of which glycerine is the most important by-product. Diatomaceous earth products will be shown as filter aids and as raw materials used as fillers and extenders in the manufacture of paper, rubber, plastics, oil and water paints, and varnishes.

Containers and packaging machinery, always an important classification of the Chemical Exposition, will be unusually well represented this year. A new type ampoule-sealing machine, never previously exhibited, will demonstrate its ability to handle with accuracy any of the numerous types of solutions which are dispensed to the public in ampoule form. This ampoule filling operation at the Exposition will be representative of modern production methods now being adopted by pharmaceutical laboratories throughout the United States.

Plant equipment designed for carrying out all the unit processes of chemical engineering efficiently and economically will constitute a large section of the Exposition. The art of controlling the flow of bulk material by vibration will be demonstrated by equipment which should prove fascinating to exposition visitors. This display will include electro-magnetic vibrators, vibratory feeder conveyors, volumetric feeder machines, and weigh feeder machine equipment.

Curtail Mechanical Orders

In an effort to prevent users of mechanical rubber goods from loading up and to protect themselves against rising prices of crude rubber, both the Goodyear and Goodrich companies have notified their respective representatives not to accept orders at present prices for shipment after October 1st. Other manufacturers of mechanical rubber goods are expected to follow suit shortly. Ordinarily, mechanical goods buyers carry supplies sufficient for approximately thirty days requirements.

NEW GOODYEAR PLANT FOR ST. MARYS, OHIO

Plans for the erection of a new manufacturing plant in St. Marys, Ohio, were announced early this month by P. W. Litchfield, president of the Goodyear Tire & Rubber Co., Akron. The plant, according to the announcement, will be devoted to the production of mechanical rubber goods.

Approximately 60 acres of land has been acquired at the outskirts of St. Marys and along the Nickel Plate right of way. An abundant supply of water is available from deep wells and the nearby Grand Lake.

Ground will be broken immediately for a factory structure measuring 100 feet by 500 feet and it is expected that manufacturing operations will be under way around January 1st. The location provides adequate room for future expansion as the needs may arise and the original plant, together with equipment, will represent an investment of approximately one million dollars.

It is expected that four hundred persons will be employed when full scale production is attained. Every effort will be made to minimize seasonal fluctuations in production to the end that employment may attain a high degree of stability. The factory structure will be of the modern single story type which permits efficiency of layout along with good lighting and ventilation.

In making the announcement, President Litchfield expressed his personal appreciation for the helpful cooperation given Goodyear executives by public officials and civic leaders of St. Marys under the leadership of Mayor Albert M. Koch. The plans have been developed over a period of several months during which St. Marys citizens were active in working out numerous details.

USE OF COTTON IN THE RUBBER INDUSTRY

During the calendar year of 1938 approximately 241,000,000 pounds of raw cotton, equivalent to 504,200 bales, were used in the manufacture of all types of rubber products, according to information recently supplied by the Cotton-Textile Institute, Inc., 320 Broadway, New York City. The figure represents approximately 8½% of the total cotton consumed in the United States during that year.

The largest use of cotton in the rubber industry is in tires. The cord fabric and square woven fabric used in the production of tires accounted for approximately 190,000,000 pounds, or 397,500 bales. Some 11,000,000 pounds, or 23,000 bales, went into the manufacture of rubber footwear. Cotton fabrics constitute the uppers of canvas rubber-soled shoes, such as tennis shoes, and they are also used in the lining of rubbers, gaiters and other types of waterproof footwear.

Approximately 40,000,000 pounds, or 83,700 bales, were used in the manufacture of other rubber products. About 25,000,000 pounds, or 52,300 bales, went into the manufacture of hose, belting and other mechanical goods, while some 15,000,000 pounds, or 31,400 bales, were consumed in the production of rubberized fabrics, such as those employed in the manufacture of raincoats, in automobile top fabrics and tire covers, hospital sheeting and miscellaneous types, including those used in the manufacture of heels and soles.

Takes Title to Crops

Secretary of Agriculture Henry A. Wallace moved on August 17 to exchange American cotton for rubber from Great Britain in accordance with the barter agreement when he announced that the Commodity Credit Corporation has taken title to the remainder of the 1934 cotton crop under Government loans. It was first feared that when war was declared by England against Germany the agreement would be either discarded or delayed, but later events indicate that the agreement will be carried out shortly as originally planned. The Commodity Credit Corporation secured the cotton by closing out loans averaging 12 cents a pound for the 1934 cotton. Carrying charges and interest on the cotton will bring the total cost to the Government to approximately 16 cents a pound, according to estimates at Washirgton. The barter agreement calls for the exchange of approximately 600,000 bales of cotton for 80,000 tons of crude rubber.

Consolidating Operations

The mechanical rubber products division of the Armstrong Cork Company, now located at the company's main plant in Lancaster, Penna., will be consolidated with the rubber flooring operations of the company conducted at its South Braintree, Mass., factory.

FINANCIAL NEWS

Fisk Rubber Corp.

First Half: Net income of $401,018, after provision for Federal taxes, reserves for contingencies and other charges, equal to 68 cents each on 439,923 shares of common stock after providing for preferred dividends. This compares with net income of $172,298, after charges, or 15 cents a common share after dividend requirements, reported in the corresponding period of the previous year. The company recently allotted $1,200,000 for reseach work.

Raybestos-Manhattan, Inc.

First Half: Net profit of $709,130, or $1.12 a share, after providing $351,917 for depreciation and $160,153 for Federal and state income taxes. This compares with a net loss of $302,351, after providing $372,878 for depreciation, in the corresponding period of the previous year. Total assets at June 30, 1939, amounted to $18,064,322, equivalent to 10.7 times the current liabilities. There were no banking or funded debt or other capital obligations outstanding.

New Jersey Zinc Co.

First Half: Net profit of $2,047,648, equal to $1.04 each on 1,963,264 shares of $25-par capital stock, which compares with one of $1,386,858, or 70 cents a share, reported in the first half of last year. For the second quarter of the current year, the company had a net profit of $971,382, or 49 cents a share, as compared with $734,262, or 37 cents a share, in the corresponding quarter of 1938.

American Cyanamid Co.

First Half: Net profit of $2,149,714, equal after dividend requirements on the preferred stock to 80 cents a share on 2,618,369 common shares. This compares with net profit of $524,649, or 19 cents a common share, reported for the first half of the previous year.

Intercontinental Rubber Co.

First Half: Net profit of $96,967, after shut-down expenses, equal to 16 cents each on 595,832 shares of no-par capital stock, excluding 172 shares in the company's treasury. The company reported a net loss of $77,777 in the first half of 1938.

Philadelphia Insulated Wire

First Half: Net income of $49,915, equal to $9.98 each on 5,000 shares of $5.50 preferred stock, which compares with $75,595, or $15.12 a preferred share, in the corresponding period of the previous year.

Columbian Carbon Co.

First Half: Net profit of $1,633,599, after depreciation and depletion, Federal taxes, interest and other charges, equal to $3.04 each on 537,406 shares of common stock, which compares with $1,377,072, or $2.56 a share, in the first six months of 1938. Current assets on June 30, 1939, amounted to $7,125,298 and current liabilities to $841,006, which compares with $6,114,337 and $1,155,261, respectively, at the end of June, 1938.

Carbon Black Process

A German concern has recently developed a new process for the production of carbon black from coke oven gas, according to the American Consulate General at Frankfort-on-Main, Germany. The process is said to be based upon the uninterrupted conversion of coke oven gases with water-steam on heated stone surfaces, mainly to carbon monoxide and hydrogen, through decomposition of the methane contained in the blast furnace gases. A fine gas black, with a density of 1.90, is precipitated by running water slowly through the gas. The carbon black so obtained is reported to be especially suitable for use in certain rubber mixtures.

Chiksan Changes Name

The Chiksan Oil Tool Co., Ltd., Fullerton, California, has changed its name to the Chiksan Tool Company and is also moving into its own factory in Brea, California. The company manufactures a complete line of ball bearing and swing joints used in the rubber and other industries. In accordance with a recent agreement, Chiksan's products will be distributed nationally by the Crane Company.

Time Study Clinic

A National Motion and Time Study Clinic will be held at the Medinah Club in Chicago on November 3 and 4 under the sponsorship of the Industrial Management Society. It will be similar in character to the clinic held last year which attracted an attendance of approximately eight hundred. The Industrial Management Society maintains headquarters at 205 West Wacker Drive, Chicago.

Trade Opportunity

Establishments Chavrier & Chabot, 67 Rue Bellecombe, Lyons, France, is interested in making contact with American manufacturers of industrial sponge rubber suitable for use in the refrigerator, furniture and other industries. The concern, which travels salesmen throughout France, desires to secure exclusive agencies if possible.

NEW FIRM TO HANDLE FOREIGN OPERATIONS

Due to the increased number and volume of manufacturing operations outside of the United States, a new company, called Goodyear Foreign Operations, Inc., has been organized to oversee the operation of all Goodyear factories in foreign countries. As heretofore, A. G. Cameron will oversee the functions of foreign distribution, but G. K. Hinshaw, chief chemist, has been made responsible for all production operations. Mr. Hinshaw will deal directly with the superintendents of each foreign factory.

Financial matters of Goodyear Foreign Operations, Inc., will be under the direction of R. B. Howard, assistant treasurer of Goodyear, who recently returned from several years of service in the company's Australian organization. C. L. Weberg will handle the comptroller's functions while C. A. Failing will be in charge of legal matters. All officers of the new concern will be responsible to the officers of the parent company and will devote themselves completely to operations outside of the United States.

It was also announced that the functions of the development, research and machine design departments at Akron have been consolidated and will hereafter be conducted in a single division under the direction of W. S. Wolfe. R. P. Dinsmore, assistant factory manager, will act as assistant manager of the newly consolidated division. In addition, Mr. Dinsmore will take care of the duties formerly handled by Mr. Hinshaw.

Request Tire Standards

One result of the price wars which have beset the tire dealer industry in recent months was the filing of a petition last month by the National Association of Independent Tire Dealers, of New York City, headed by George Burger, to the Department of Commerce requesting that the Division of Trade Standards of the National Bureau of Standards institute and arrange for a conference for the purpose of adopting standards for the tire industry. The Division was asked to invite retailers, wholesalers and manufacturers within the tire industry so that "standards satisfactory to all branches of the industry may be drawn up."

Skimp on Rubber Gloves

The use of rubber gloves by surgeons, except in the event of major operations, has been ruled out by Germany in its four-year plan of national self-sufficiency. Doctors have been advised "to wash their hands several minutes longer in order to economize on valuable rubber gloves." Other suggestions advanced to further the country's campaign for autarchy include the substitution of cloth gloves for rubber gloves in aseptic operations and the repeated use of bandages and compresses after they have been laundered.

Los Angeles News

Approximately forty-five members and guests of the Los Angeles Group, Rubber Division, A.C.S., participated in the annual fishing trip, held on Friday and Saturday, August 11 and 12. The group had dinner at the California Yacht Club in Wilmington, Calif., on Friday evening and then sailed to Santa Catalina Island to spend the night in cottages. The excursion pulled into fishing waters early on Saturday morning and returned to port in the late afternoon. While no whales or man-eating sharks were captured, the group reported itself well satisfied with the haul. W. C. Holmes (Dill Mfg.) was chairman of the event. He was ably assisted on arrangements by L. F. MacDonald (Goodrich), Richard E. Behrman (U. S. Rubber), R. E. Hutchinson (Firestone), J. F. Bridgman (Goodyear), Edward L. Royal (H. M. Royal, Inc.), and Garvin Drew (Schrader).

Numerous prizes were awarded winners of scheduled events. The grand prize, a fishing reel, was won by W. E. Head (Goodrich), while the consolation prize went to Bill Haney (Kirkhill Rubber). Merriment was added to the occasion in the awarding of the following prizes: the Ananias prize, won by Dick Bonham (Goodrich); the Liar's prize, won by Lou Konig (Meldowny & Martin); the Izaak Walton prize, won by Ed Royal (H. M. Royal, Inc.); the Guessing Contest prize, won by Wat Tapping (Cutler-Hammer); the booby prize, won by Ernie Brazil (Blue Star Mines); and the Sea Sick prizes, awarded to several "contestants" due to the closeness of the competition. Twelve float balls were distributed as door prizes at the supper held at the California Yacht Club.

The various prizes were made possible by contributions from the following companies: American Cyanamid & Chemical Corp., Blue Star Mines, Ltd., Dill Mfg. Co., DuPont, J. M. Huber, Inc., Johnson Steel & Wire Co., H. Muehlstein & Co., Pacific Coast Talc Co., H. M. Royal, Inc., A. Schrader's Son, West American Rubber Co., and the Western Shade Cloth Co. According to Chairman Holmes, the excursion more than paid its costs. The next major event of the Group will be the first monthly supper meeting of the new season to be held on October 3 at the Mayfair Hotel in Los Angeles.

C. L. Patterson, president of the Patterson-Ballagh Corp., Ltd., for several years, has retired from that position and has been succeeded by D. G. Miller. The latter was formerly associated with the Johnson Pump Company. J. C. Ballagh remains as secretary and treasurer of the corporation which retains headquarters at 1900 East 65th Street. The "Ltd." has been dropped from the corporation name. Patterson-Ballagh, which specializes in the production of molded rubber parts for oil well drilling equipment, has recently added new hydraulic installation machines to its equipment. These machines install rubber casing protectors on drill pipes before they are lowered into the well.

Faulhaber Rubber Co., 1346 East Slauson Avenue, producers of rubber floor coverings, has increased production capacity by the installation of a new mill. Several new patterns in rubber tile and other floor coverings have been introduced, many of them featuring lighter shades. Karl W. Faulhaber, head of the concern, states that two full shifts are now operating and that business has never been better. The company is also offering a vulcanization service to other rubber manufacturers in the Los Angeles area.

The Mihm Rubber Company, formerly located at 1414 East Slauson Avenue, is now located in new and larger quarters at 1172 East Slauson Avenue. A new mill, as well as other equipment, has been installed. The company, manufacturer of molded rubber goods, was established by Edward Mihm in 1931. Mr. Mihm died last year and the company is now owned by E. L. Kennedy who was formerly engaged in sales promotion work in Oakland. H. L. Arbogast is chief chemist.

The roll covering department of the Rubbercraft Corp. of California, Ltd., at Torrance, Calif., is now operating 24 hours per day. In order to keep up with its rapidly expanding business, the company has installed several new pieces of apparatus in the past month, including a calender and two roll grinding lathes.

Work is still in progress on the building occupied by the Latex Seamless Rubber Company at 4620 East Washington Street. The company is headed by Carl E. Stentz.

P. R. Levering, formerly time study engineer at the Goodrich plant, has been named employment and personnel director, succeeding J. A. Clark who held the position for many years. W. E. Head recently arrived from Akron to take charge of the time study division.

Employees of the West American Rubber Company and their families held their annual summer picnic event at Brookside Park in Pasadena on September 1. Athletic contests, with prizes for the winners, were the highlights of the day.

Reorganization Denied

The petitions filed several months ago by the Standard Latex Products Company, Carlstadt, N. J., and its affiliate, Mayfair Chemical Company, New York City, for reorganization under the national bankruptcy act were dismissed in the Federal Court at Newark, N. J., on August 14, by Judge Guy L. Fake.

New England News

Plans for expenditure of $1,200,000 for research and new equipment in the next 18 months have been announced by Col. Charles E. Speaks, president of the Fisk Rubber Corp., Chicopee Falls, Mass. The company's research department has already started work on the development of tires designed to meet high speed conditions on super highways of 1950 and following years.

Col. Speaks declared that the research program was an indication that business has taken heart from the actions of Congress at its last session. He reported many encouraging signs of continual improvement in general business. July showed a steadiness in contrast with normal slack conditions during that month, the Fisk president said.

General Manager S. A. Steere of the Goodyear textile and fabric division has announced that Goodyear Fabric Mills officials are going ahead with plans to dismantle the New Bedford, Mass., plant. Some of the machinery will be sent to Goodyear mills in the South and the rest will be sold, he said. Lack of business has made it impossible to consider reopening the mill, Mr. Steere added. The mill closed early in 1938, when about 1,000 hands were employed.

Hubert J. Donnelly has been elected president of the H. O. Canfield Co., Bridgeport, Conn., filling the vacancy caused by the recent death of A. H. Canfield. Mr. Donnelly joined the company as secretary to Mr. Canfield 27 years ago. Maturin B. Waldo has been named secretary and Delbert M. Wade, treasurer. Mr. Wade is production manager of the company, which manufactures drug sundries, household, molded and sponge rubber goods.

Nearly 10,000 men, women and children participated in the fifth annual outing of the United States Rubber Co. on August 12 at Lake Quassapaug, Middlebury, Conn. Refreshments, prize contests, games and dancing provided entertainment for the huge throng which came from the mills in Naugatuck by automobile and bus. A committee of 100 employees handled arrangements.

GIANT TIRES MADE FOR POLAR CRUISER

Rounding out a cycle of events that have made the current year one of exceptional importance to the rubber industry, the 300,000,000th pneumatic tire to be manufactured by the Goodyear Tire & Rubber Company was lifted from its mold on August 9. In addition to being the centennial of the discovery of vulcanization by Charles Goodyear, 1939 also marks the fiftieth anniversary of the first pneumatic tire.

The 300,000,000th tire is in itself unusual and will have an unusual purpose. It is the first of six giant casings that are being constructed by Goodyear for the Research Foundation of the Armour Institute of Technology and will be fitted on a huge "snow cruiser" to be used in exploring the frozen wastes of the Antarctic.

These giant tires will be the biggest ever manufactured for actual use on a motor vehicle, according to Goodyear, being 10 feet in overall diameter, nearly a yard in cross section, and of 12-ply construction. The "snow cruiser" itself, designed by Dr. Thomas Poulter, will be 55 feet long, 15 feet wide, 15 feet high, and will weigh 75,000 pounds loaded. It will carry sufficient fuel and supplies to allow its crew of four to remain away from permanent bases for a year at a time if necessary.

Philco Name Protected

The Philadelphia Rubber Waste Co., scrap rubber dealer of Philadelphia, Penna., and Albert Schwarz, Isadore M. Engel and Simon Sperberg, trading as Philco Rubber Co., Philco Rubber Sales Co., Philco Auto & Rubber Supply and Philco Spark Plug Co., Washington, D. C., and Richmond, Va., have been ordered by the Federal Trade Commission to discontinue the unauthorized use of a well-known trade name in the sale and distribution of their merchandise. The Commission held that by labelling inner tubes, spark plugs and repair parts for tires and tubes with the designation "Philco," the respondents were representing that their products were manufactured by the Philadelphia Storage Battery Company which has been manufacturing radios and other electrical devices under the "Philco" trade-name for many years.

Another Firestone Plant

With the announcement that the company has started construction of a rubber factory at Bombay, India, another unit in the world-wide manufacturing facilities of the Firestone Tire & Rubber Company will commence operations shortly. It is believed that the latest plant will start manufacturing activities by late fall. The Bombay plant will be the seventh factory built by Firestone in foreign countries, the others being located in Canada, England, Spain, Switzerland, Argentina and South Africa.

Complete Encyclopedia

The second volume of the *Encyclopedie Technologique du Caoutchouc (Technical Encyclopedia of Rubber)* has made its appearance. Whereas the first volume treated with the properties of rubber, current trends in the rubber industry and control methods, this book deals with the preparation of compounds and the improved methods of manufacturing a variety of rubber products, from tires to thread. Published by *La Revue Generale du Caoutchouc*, 9 Avenue Hoche, Paris, France, both volumes sell for 350 francs (approximately $8.75 at the current rate of exchange). A review of both volumes appeared in the November, 1938, issue of THE RUBBER AGE.

Obituaries

Edward C. Conlin

Edward Charles Conlin, sales manager of the golf ball division of the U. S. Rubber Company for sixteen years until ill health forced his resignation last April, died at his home, 360 East 55th St., New York City, on August 21. He was 61 years of age. Mr. Conlin was one of the first tennis umpires and officiated at Davis Cup matches for a number of years. Born in New York City, Mr. Conlin left school at an early age to join Scribner's Magazine, of which he finally became advertising manager. He later acted as advertising manager for the Munsey publications. During his tenure as manager of golf ball sales for U. S. Rubber, he served as a vice-president of the Golf Manufacturers Association. Funeral services were held on August 23 with interment in Cypress Hills Cemetery, Brooklyn, N. Y. He leaves a widow and two children.

Urban F. May

Urban F. May, assistant purchasing agent for the General Tire & Rubber Co., died in St. Thomas Hospital in Akron on August 27 at the age of 48 after an illness of four months. Born in Suffield, Ohio, Mr. May had lived in Akron since he was 16 and had been with General Tire for twenty-two years at the time of his death. Funeral services were held on August 30 with interment in St. Joseph's Cemetery, St. Joseph, Ohio. He leaves a widow, two sons and two daughters.

James E. Odell

James Eustace Odell, who was in the crude rubber business in Boston from 1885 until he formed his own firm in New York City in 1925, died at the home of a son in Mountain Lakes, N. J., at the age of 74 on August 26. Recently he had been associated with Francis I. du Pont & Co. Mr. Odell was born in Stratham, New Hampshire. He leaves a widow, two sons and a daughter.

AGENCY TO MARKET K-TREATED PROCESS

Comprehensive Fabrics, Inc., a new sales and merchandising organization, has been formed to develop national distribution of the K-treated process in the fabrics field. This process embraces the impregnation, coating or spraying of fabrics of all kinds with Koroseal, the polyvinyl chloride rubber developed by the B. F. Goodrich Company. Joseph A. Kaplan is president of the new company, which has taken quarters at 37 West 27th Street in New York City, and Karl F. Egge, formerly with the Bamberger and Bloomingdale department stores, is sales and promotion manager.

The new organization will issue licenses to manufacturers in each of many lines of K-treated merchandise. Samples illustrating the versatility of Koroseal have been developed by fabric designers in collaboration with Goodrich technicians during a six-month period of research and testing. K-treated fabrics are said to resist damage by corrosion, water, sun, oils and alcohols, while remaining odorless, washable and pliable in all weather.

Consider Argentina Plant

The United States Rubber Company is believed to be considering the possibility of constructing a branch plant in the Argentine, probably near Buenos Aires. It has been learned that two U. S. Rubber executives have been in the Argentine for several months making an extensive survey of the South American market and the decision of the company will probably rest on the report they bring back. Goodyear and Firestone now have branch plants in South America while Goodrich cooperates with one of the leading rubber manufacturers in that country. Production of American rubber goods in Argentina is said to be advantageous because of the import restrictions on rubber products.

Two New Huber Clays

Under the trade-names of Barden and Chicora, two new clays have been introduced by J. M. Huber, Inc., New York City. Barden clay is said to develop a higher tensile strength and abrasion resistance in rubber compounds than other clays, but at some sacrifice in modulus, while Chicora clay develops a distinctly higher modulus, but with somewhat lower tensile strength and abrasion resistance. Huber also produces Suprex, Paragon and Hi-White clays.

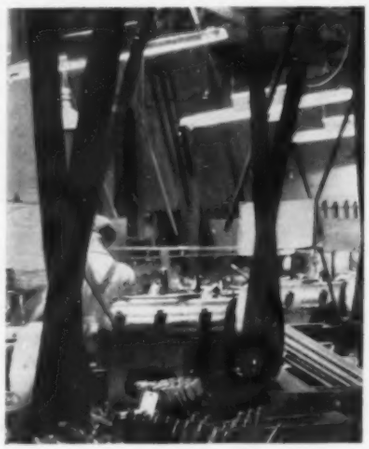
Issue Rim Supplement

A supplement to its 1939 Year Book has been issued by the Tire & Rim Association, Inc., Cleveland, Ohio, under the title "Wide Base Tires and Rims for Agricultural Tractors." As the title indicates, data is given of interest to manufacturers and users of tractors and tractor tires.

New Rubber Goods

Hewitt Transmission Belt

An all-neoprene friction surface transmission belt has been introduced by the Hewitt Rubber Corp., Buffalo, New York, under the name of the Duroil



Hewprene Transmission Belt. The new belt is primarily designed for use in machine shops, automobile plants and in other fields where oil comes in contact with transmission belting. Hewprene friction and skim coat of rubber between all plies in the belt provides high flexing life over high speed pulleys. The coat also protects the cotton duck against wear, ply separation, and softening from oil at high temperatures. Tests have indicated that when exposed to oil the new belts require less take-up and maintenance supervision than rubber belts due to low stretch by virtue of their oil-proof quality. Hewprene is the name given by Hewitt to products containing neoprene.

Goldman Caster Cups

A line of caster cups for furniture and other uses, made with a ¼-inch sponge rubber filler covered with fine quality mohair, is being merchandised by Harry Goldman, 230 West 58th St., New York City. The filler prevents the scratching of floors or the marking of rugs, and also aids in absorbing vibration. The cups are supplied in both walnut and mahogany finish. They are packed three dozen of a color to the box.

Fisk Self-Sealing Tube

A self-sealing tube, in a patented triangular shape, which employs the principle of compression to make a rubber seal around any entering object, has been introduced by the Fisk Tire Company, Chicopee Falls, Mass. The dome is made of heavier gauge rubber than a standard tube and is reinforced by three heavy circumferential rubber ribs. These ribs anchor the tube against the tire carcass and prevent it from creeping away from the puncturing object. Compression is secured by making the dome wider than the interior of the tire. The tube is said to withstand punctures by objects up to the size of a ten-penny nail.

Raymaster Truck Tire

An advanced U. S. Royal Raymaster truck tire with rayon cord, said to have been expressly engineered for rayon throughout its entire structure, has been announced by the U. S. Tire Dealers Corp., 1790 Broadway, New York City. The new tire, according to its manufacturer, offers 16% more tread wear minimum and up to 136% greater overall mileage, depending on operating conditions. It is also said to save up to 12½% in power consumption and, due to its tougher and stronger carcass, to provide a sounder base for recapping.

Van Cleef Figurettes

Made of moisture-proof and durable material, a line of modern wall decorations is being merchandised by Van Cleef Bros., Woodlawn Avenue and 77th Street, Chicago, Ill., under the name of Dec-O-Tape and Figurettes. The former is a self-adhesive tape, supplied in eight attractive colors, while the Figurettes are ready-cut designs. There is no moistening, glue, fuss or

muss connected with these novelties. All the user has to do is stick Dec-O-Tape or Figurettes on the wall and form colorful border and panel effects. Should they become soiled, they can be sponged off while on the wall, or they can be removed easily at any time without marring the surface. Several interesting bathroom designs are available, including sailing yachts, fish, stars, crescents and birds. Dec-O-Tape and Figurettes are also said to offer unique gift-package wrapping possibilities.

Recap Indicator Tire

Based on the belief that modern recapping is a thoroughly proven method of renewing the life and mileage of a tire, the Denman Tire & Rubber Co., Warren, Ohio, has introduced a "double-life" truck tire with a recap indicator. This indicator consists of a line

of red spots built into the tire which become exposed when approximately 17-32nds of an inch of the tire is worn away. It is estimated that the tire will stand up for some 25,000 miles before the recap signal appears in the tire, and therefore should the tire be recapped as soon as the signal shows the tire should be good for an additional 25,000 miles. Once the recap indicator appears on the surface, the tire may still be used for an approximate 6,000 miles more, or until an additional 4/32nds of an inch is worn away, but this is referred to in truck tire circles as the "danger zone." The new tire is primarily intended for fleet operating use.

Ruskin "Splires"

Ruskin Products Co., 5656 North Hermitage Ave., Chicago, is merchandising a fabric-backed rubber insulation device, measuring approximately 2 inches in length, under the trade-name of "Splires." The new item is designed to cover a splice in a two-conductor electric cord, and not only seals the splice effectively but presents a smooth outside surface. Any splice can be quickly made with "Splires" which are protected until used with an adhesive covering. Two handy tabs make it a simple matter to remove this covering when desired.

New Fisk Tire

A tire which departs from old principles of solid tread construction and has its surface broken into more than 500 separate units, has been introduced by the Fisk Tire Co., Chicopee Falls, Mass. At any given position, 50 individual sections of rubber-like pillars are in contact with the road. The units are formed by a series of soft rubber inserts which divide the seven circumferential ribs cross-wise at short intervals. Longer wearability, quicker stopping, and better traction are among the claims made for the new tire.

Rubber Bowling Ball

A new bowling ball, which is made to American Bowling Congress regulations, is being manufactured by the Manhattan Rubber Mfg. Division of Raybestos-Manhattan, Inc., Passaic, N. J. According to the manufacturer, the new balls, made of composition rubber, are as near a perfect sphere as is humanly or mechanically possible, with total variation in diameter within the thickness of a human hair. Due to this precision, it is said that they will maintain true direction with smoothness and quietness.

Oxy-Jet Water Aerator

Under the name of the Oxy-Jet Water Aerator, the Acushnet Process Co., New Bedford, Mass., has developed a new faucet attachment which is said to restore to ordinary tap water the sparkle of the spring. In operation, water flows through the aerator drawing a continuous stream of air through vents on the sides. Then the water passes through a series of fine mesh screens, mixing air and water and removing impurities. Water running through the aerator is smooth-flowing, without splash, even when running full force. Millions of air bubbles make it delicately soft to touch. As the stream of water hits the sink, it spreads smoothly, the air bubbles acting as an impact cushion. The oxygenated water formed by means of air in the Oxy-Jet Aerator is said to be light and fluffy and to lather in lightning time, giving more lather from less soap. Washing is thus easier and faster and clothes are whiter and cleaner. Acushnet Process is also merchandising the Oxy-Jet Beauty Bath Spray, made on the same principle as the Oxy-Jet Water Aerator, to give a stream of sparkling water.

Oil-Resisting Portable Cord

A new oil-resisting portable cord (Type OS), equipped with a Glyptal-neoprene jacket, has been developed by the Appliance and Merchandise Department, General Electric Co., Bridgeport, Conn. The cord is also resistant to grease, gasoline, fats, vegetable oils, acids, alkalies, lye, soaps and other agents generally destructive to rubber. The special jacket is mold-cured in lead directly over the core and is given a waxed finish. It is dense and tough, making it durable and resistant to mechanical injury. Applications of the new cord include industrial plants, service stations and garages, packing houses, and soap factories.

Ute Wet Weather Suits

The Industrial Products Co., 806 West Somerset St., Philadelphia, Penna., has introduced a new line of Ute wet weather suits. These garments, made of Ute cloth, a double texture fabric with a solid sheet of rubber vulcanized in between, are designed to afford complete protection with desired freedom of movement and comfort. There are no loose pockets, ends or straps to catch or rip, and all metal fasteners are fully covered. The suits come in a variety of styles, the one-piece garment being recommended for linemen and work that entails considerable climbing, and the two-piece garment, consisting of coat, pants and detachable hood, being practical for emergency crews, plant fire departments, traffic bureaus and general use.

Neoform Floor Mats

A new type of chair floor mat for office use has been introduced by the B. F. Goodrich Company, Akron, under the name of Neoform. The new mat incorporates a substance which is said to permit the mat to retain a polished surface and retards the penetration of dust and dirt. It measures approximately 38 x 38 inches in size and is approximately 3/16th of an inch thick. The Neoform mat is designed so that the extending lip fits between the legs of standard size desks. The lip is 10 inches long and 18 inches wide, thus providing room for the occupant of the desk chair to stretch his legs in comfort and still rest them on the mat.

Goodyear Truck Tires

Two new truck tires, which are said to represent a forward step in providing greater truck tire mileage, have been introduced by the Goodyear Tire & Rubber Co., Akron, Ohio. One of them, a new All-Weather, is said to give good traction, has ability to stop, start and resist skidding on bad roads as well as good, and is recommended for use wherever traction is in any way a problem. The other, a new Hi-Miler, is specifically designed to give long mileage for general truck and trailer service. It has two shoulder ribs to eliminate the irregular wear usually found on front wheels and trailing wheels, and two riding ribs to provide easy rolling and longer wear. Both tires have carcasses made of low-stretch Supertwist.

Rubatex Bath Mat

A new type of bath mat for use outside tub or shower is being sold by the American Mat Corporation, Toledo, Ohio. Made of Rubatex (the sponge-like material consisting of thousands of microscopic balloon-shaped cells), the mat is said to give the user the feeling of literally standing on air. It is described as being soft, always fresh looking, clean and sanitary. Excess moisture may be removed by merely drying with a towel. It may be cleaned with a damp cloth, or soap may be used if desired. The mats come in blue, green, rose and black, with an attractive sword-fish design centered on a shell pattern.

Pinocchio Characters

Gaily decorated in colors and equipped with metal reed whistles, a new line of Walt Disney characters, based on his production of "Pinocchio," has been introduced by the Seiberling Latex Products Co., Barberton, Ohio. Included in the line are Pinocchio, Jiminy Cricket, Figaro the Cat, Cleo the Goldfish, and the Donkey. Both the new lightweight latex construction and the blown rubber construction are featured. Of thicker gauge than imported latex toys, the new characters are adequately durable for children's play as well as light enough for the smallest infant. All characters are of the stand-up type, approximately 6 inches in height or length. They sell for 25 cents each. Inflated and sponge rubber balls are also available with Pinocchio character imprints.

Group of Seiberling Latex's New Pinocchio Rubber Characters.

MARKETS

RUBBER—COTTON AND FABRICS—CHEMICALS

NEW YORK, SEPTEMBER 9, 1939

Crude Rubber

UNTIL the outbreak of hostilities in Europe between Germany and Poland, the price of crude rubber on the Exchange moved in a narrow 39-point margin, the low up to that point being 16.55 on August 15 and the high 16.85 on August 24. The market was very erratic, responding to every rumor from abroad, but considerable factory interest held the price up. Germany's invasion of Poland on September 1 resulted in furious purchasing of spot and futures on the Exchange and the price of spot jumped from 16.62 on August 31 to 18.90 on September 1. The futures price advanced the full 200 point maximum permitted under Exchange rules. Persistent demand developed over the Labor Day week-end with the result that the spot price reached 24.00 on September 5. A sharp drop in factory interest the following day broke the price to 21.50 and to 20.25 on September 7. The decision of the International Rubber Regulation Committee not to withdraw any restrictions on exports from signatories for the duration of the war led to another sharp spurt in prices. Today's price, September 9, was 23.00. The London Exchange closed down shortly after England's declaration of war and no prices are available on several grades of rubber. Quotations in the outside market, Exchange and Singapore, follow:

As of August 9

Plantations—

Ribbed Smoked Sheets—

No. 1 Spot	—	@	.22
October-December	—	@	.22
January-March	—	@	.21½
No. 2	—	@	.22
No. 3	—	@	.21¾
No. 4	—	@	.21¾
Thin Latex Crepe	—	@	.24
Thick Latex Crepe	—	@	.23
Brown Crepe, No. 1	—	@	.22
Brown Crepe, No. 2	—	@	.21½
Amber Crepe, No. 2	—	@	.22
Amber Crepe, No. 3	—	@	.21½
Brown Crepe, Rolled	—	@	.19½

Latex—

Normal, per lb., carload lots	—	@	.27¾

Paras—

UpRiver, fine	—	@	—
Acre Bolivian, fine	—	@	—

Balata—

Surinam sheet	—	@	.38

LONDON MARKET

Standard Smoked Sheets—Sellers—September 9
No Quotations Available.

SINGAPORE MARKET

Standard Smoked Sheets—Sellers—September 9

October-December	—	@	10 3/32d
January-March	—	@	9 7/16d

Reclaimed Rubber

Although reclaimers have made no advances in the price structure since our last report, despite the outbreak of hostilities in Europe, there is every possibility that such advances will be in order if the conflict continues for any length of time. Business has been steady this past month. Current quotations follow:

Shoe

Unwashed	lb.	.06½	@	.06¾
Washed	lb.	.10	@	.10¼

Tube

No. 1 (Floating)	lb.	.12	@	.12¼
No. 2 (Compounded)	lb.	.08	@	.08¼
Red tube	lb.	.08	@	.08¼

Tires

Black (acid process)	lb.	.07	@	.07¼
Black, selected tires	lb.	.06	@	.06¼
Dark Gray	lb.	.09¼	@	.09¾
White	lb.	.11½	@	.12
Truck, Heavy Gravity	lb.	.05½	@	.06
Truck, Light Gravity	lb.	.07	@	.07½

Miscellaneous

Mechanical blends	lb.	.04½	@	.05

Scrap Rubber

(Delivered Akron Mills)

The European conflict has resulted in an increased demand for scrap, dealers report, with the result that prices on several grades, including auto tire peelings, clean solid truck tires and red inner tubes, have already been increased. Further demand is visualized if the conflict continues. Quotations follow:

(Prices to Consumers)

Auto tire peelings	ton	22.00	@24.00
Mixed auto	ton	12.50	@13.00
Beadless tires	ton	14.50	@15.50
Clean solid truck tires	ton	25.00	@27.00
Boots and shoes	ton	18.50	@19.50
Arctics, untrimmed	ton	13.00	@15.00
Inner tubes, No. 1	lb.	.08	@ .09
Inner tubes, No. 2	lb.	.04	@ .04½
Inner tubes, Red	lb.	.04	@ .04½

Cotton

Due to a number of unfavorable factors, the price of middling uplands on the Exchange sagged slowly but steadily from 9.47 on August 10 to 8.82 on August 28. Factors contributing to the decline included the threatening European situation, weaker stock market, fear of a high Government crop estimate, and the unsettled exchange markets which resulted in large scale liquidation of the Bombay long interest. The decline was halted from time to time by recurring reports of less favorable weather in the cotton belt. The outbreak of hostilities found a nervous market but the price range was moderate in view of the nature of the news. Heavy buying credited to Wall Street accounts and to Southern operators, plus the fact that Liverpool and Europe were buying futures to protect forward cotton needs, resulted in a price jump of 38 points to 9.25 on September 5. These factors, in addition to speculative demand, brought the price up to 10 cents, a new high for the current movement, on September 7. The Crop Reporting Board's estimate of 12,380,000 bales for the year, considerably higher than the previous estimate, broke the price. Quotations for middling uplands on the Exchange follow:

	Aug. 9	September 9		
	Close	High	Low	Close
October	8.93	9.13	9.13	9.13
December	8.73	9.20	9.09	9.09
March	8.50	9.26	9.02	9.02

Tire Fabrics

(Prices Net at the Mill)

Peeler, carded, 23/5/3	lb.	.28¼ @	—
Peeler, carded, 23/4/3	lb.	.29¼ @	—
Peeler, carded, 15/3/3	lb.	.26¼ @	—
Peeler, carded, 15/4/2	lb.	.26¼ @	—
Peeler, carded, 13/3/3	lb.	.25¼ @	—
Egyptian, carded, 23/5/3	lb.	.40 @	—

CHAFERS

Carded, American, 1 1/16"	lb.	.27½ @	.27¾
Carded, American, 1"	lb.	.18 @	.24

Sheetings

48x40	36 in.	5.50	lb.	— @	.04¼
40x40	36 in.	6.15	lb.	— @	.04
40x36	36 in.	6.50	lb.	— @	.03⅞
48x48	40 in.	2.50	lb.	— @	.08⅜
48x48	40 in.	2.85	lb.	— @	.07½
56x60	40 in.	3.60	lb.	— @	.06½
48x44	40 in.	3.75	lb.	— @	.06½

Ducks

Enameling (single filling)	lb.	.23	@	.25
Belting and Hose	lb.	.29	@	—
Single filling, A grade	lb.	.10¼	@	.11¼
Double filling	lb.	.11¼	@	.12¼

Closing Rubber Prices on New York Commodity Exchange, Inc.

No. 1 Standard Contract of 10 tons

FROM AUGUST 10 TO SEPTEMBER 9

Date	Spot	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sales
Aug. 10	16.58	16.48	16.52	16.52	16.55	16.58	16.58	16.59	16.60	16.60	16.61	16.62	16.62	——	157
11	16.58	16.48	16.52	16.53	16.54	16.59	16.60	16.60	16.64	16.64	16.65	16.66	16.67	——	164
12	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——
13	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——
14	16.60	16.49	16.53	16.56	16.59	16.63	16.64	16.66	16.68	16.68	16.69	16.70	16.71	——	250
15	16.55	16.44	16.48	16.50	16.52	16.55	16.56	16.56	16.57	16.57	16.58	16.59	16.60	——	135
16	16.65	16.43	16.47	16.48	16.49	16.50	16.51	16.51	16.52	16.52	16.53	16.54	16.55	——	213
17	16.60	16.48	16.52	16.54	16.55	16.56	16.57	16.58	16.59	16.59	16.60	16.61	16.62	——	73
18	16.75	16.67	16.67	16.65	16.64	16.63	16.63	16.63	16.64	16.65	16.66	16.67	16.68	——	228
19	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——
20	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——
21	16.75	16.67	16.67	16.65	16.63	16.62	16.62	16.62	16.62	16.62	16.61	16.62	16.63	——	93
22	16.68	16.60	16.60	16.59	16.59	16.59	16.59	16.59	16.59	16.59	16.59	16.60	16.61	——	125
23	16.70	16.60	16.60	16.57	16.53	16.50	16.49	16.49	16.49	16.49	16.49	16.50	16.51	——	197
24	16.85	16.78	16.78	16.76	16.70	16.63	16.60	16.57	16.55	16.55	16.55	16.56	16.57	——	183
25	16.85	16.75	16.75	16.73	16.61	16.48	16.46	16.43	16.41	16.39	16.37	16.37	16.37	——	188
26	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——
27	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——
28	16.75	16.63	16.61	16.54	16.47	16.39	16.37	16.36	16.35	16.32	16.28	16.28	16.28	——	161
29	16.60	——	16.43	16.33	16.29	16.24	16.17	16.21	16.24	16.23	16.20	16.20	16.20	——	194
30	16.62	——	16.50	16.40	16.34	16.28	16.26	16.25	16.24	16.23	16.20	16.20	16.20	——	124
31	16.62	——	16.46	16.36	16.29	16.22	16.20	16.19	16.18	16.17	16.15	16.15	16.15	——	92
Sept. 1	18.90	——	18.75	18.36	18.29	18.22	18.20	18.19	18.18	18.17	18.15	18.15	18.15	18.15	586
2	18.50	——	18.15	18.00	17.95	17.90	17.89	17.88	17.88	17.85	17.85	17.85	17.85	17.85	364
3	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——
4	——	——	——	——	——	——	——	——	——	——	——	——	——	——	——
5	24.00	——	23.50	20.00	19.95	19.90	19.89	19.88	19.88	19.85	19.85	19.85	19.85	19.85	101
6	21.50	——	20.95	20.00	19.94	19.88	19.85	19.78	19.68	19.68	19.70	19.70	19.70	19.70	534
7	20.25	——	19.30	18.70	18.58	18.40	18.32	18.32	18.31	18.30	18.25	18.25	18.25	18.25	512
8	21.00	——	19.95	19.20	19.13	19.05	18.72	18.72	18.71	18.72	18.85	18.85	18.85	18.85	355
9	23.00	——	22.00	21.00	20.95	20.95	20.15	20.16	20.13	20.16	20.16	20.16	20.16	20.16	296

New York
September 11, 1939

Rubber CHEMICAL Markets

All Quotations F.O.B. Works Unless Noted

ACCELERATORS

Organic			
A-1 (Thiocarbanilid)	lb.	.24 @	.30
A-10	lb.	.31 @	.35
A-11	lb.	.32 @	.65
A-19	lb.	.52 @	.65
A-32	lb.	.70 @	.80
A-77	lb.	.42 @	.55
A-100	lb.	.42 @	.55
Aldehyde ammonia, crystals	lb.	.65 @	.70
Altax	lb.	.55 @	.65
Butyl Zimate	lb.	2.50 @	—
Captax	lb.	.50 @	.60
Crylene	lb.	.55 @	.65
paste	lb.	.45 @	.55
Di-Ortho-Tolyguanidine	lb.	.44 @	.46
Diphenylguanidine	lb.	.35 @	.45
El-Sixty	lb.	.50 @	.65
Ethyl Zimate	lb.	2.50 @	—
Ethylidene aniline	lb.	.42 @	.43
Formaldehyde aniline	lb.	.37½ @	.42
Guantal	lb.	.40 @	.50
Heptene	lb.	.35 @	.40
Hexamethylenetetramine	lb.	.33 @	—
Lead Oleate, No. 999	lb.	.14 @	—
Witco		.15 @	—
Lithex	lb.	.18 @	.20
Methylenedianiline	lb.	.36 @	.37
Monex	lb.	— @	2.35
Oxynone	lb.	.64 @	.80
Phenex	lb.	.50 @	.55
Pip-Pip	lb.	2.50 @	—
Pipsolene	lb.	1.55 @	1.85
R & H 40	lb.	.40 @	.41
R & H 50-D	lb.	.42 @	.43
R-2	lb.	1.40 @	1.80
R-2 Crystals	lb.	2.50 @	2.75
R-23	lb.	.40 @	—
RN-2	lb.	1.40 @	1.80
RN-2 Crystals	lb.	2.00 @	2.25
Rotax	lb.	.60 @	.65
Safex	lb.	1.25 @	1.30
SPDX	lb.	.70 @	.75
Super-Sulphur No. 1	lb.	.50 @	—
No. 2	lb.	.18 @	.20
Thiocarbanilid, drums	lb.	.24 @	.30
Trimene	lb.	.55 @	.65
base	lb.	1.05 @	1.20
Triphenylguanidine	lb.	.45 @	—
Tuads	lb.	2.35 @	—
Ulto	lb.	1.50 @	1.75
Ureka	lb.	.60 @	.75
Ureka Blend B	lb.	.60 @	.75
Ureka C	lb.	.56 @	.65
Vulcanex	lb.	.42 @	.43
Vulcanol	lb.	.85 @	—
Zimate	lb.	2.35 @	—
Inorganic			
Litharge, domestic	lb.	.07 @	.07½
Magnesia, calcined, heavy	lb.	.04 @	—

COLORS

Blacks (See Compounding Materials)

Blues			
Prussian	lb.	.36 @	.37
Ultramarine	lb.	.15 @	—
Browns			
Mapico	lb.	.13 @	—
Umber, Turkey	lb	.04 @	.04½
Greens			
Chrome	lb.	.21 @	—
Chromium Oxide, bbl.	lb.	.21 @	—
Guignet's Green	lb.	.?0 @	—
Reds			
Antimony crimson, 15/17	lb.	.45 @	—
sulfur, free	lb.	.48 @	.60
Indian English	lb.	.09 @	.10
Domestic (Maroon)	lb.	.11 @	—
Red oxide, pure	lb.	.10 @	.12
Rub-Er-Red, f.o.b. Easton	lb.	.09¼ @	—
Whites			
Cryptone, No. 19	lb.	.05¾ @	.05½
Cryptone CB, No. 21	lb.	.05¾ @	.05½
Cryptone, ZS-230	lb.	.07½ @	.07¾
Cryptone, ZS-86	lb.	.07½ @	.07¾
Lithopone			
Albalith, black label—11	lb.	.03¾ @	.04
Azolith	lb.	.03¾ @	.04
Ray-bar	lb.	.05⅝ @	.06⅛
Ray-cal	lb.	.05⅝ @	.06⅛
Rayox	lb.	.14 @	.17
Titanox A	lb.	.13 @	.13¾
Titanox B	lb.	.05¾ @	.05½
Titanox C	lb.	.05¾ @	.05½
Zinc Oxide—American Process			
American Azo: ZZZ (lead free)	lb.	.06¼ @	.06½
Anaconda, lead free	lb.	.06¼ @	.06½
Horsehead Lead Free Brand:			
Special—3	lb.	.06¼ @	.06½
XX Red—4	lb.	.06¼ @	.06½
XX Red—72	lb.	.06¼ @	.06½
XX Red—78	lb.	.06¼ @	.06½
XX Red—103	lb.	.06¼ @	.06½
Kadox, black label—15	lb.	.06½ @	.06¾
Blue label—16	lb.	.06½ @	.06¾
Red label—17	lb.	.06½ @	.06¾
St. Joe, black label	lb.	.06¼ @	.06½
green label	lb.	.06¼ @	.06½
red label	lb.	.06¼ @	.06½
U. S. P.—7. bbls	lb.	.09½ @	.09¾
Zinc Oxide—French Process			
Florence White seal—7 bbls.	lb.	.08½ @	.08¾
Green seal—8	lb.	.08 @	.08¼
Red seal—9	lb.	.07½ @	.07¾
Yellows			
Cadmolith	lb.	.45 @	.50
Chrome	lb.	.14½ @	.15½
Mapico	lb.	.09½ @	—

BLACKS

Arrow "Aerfloted" Specification	lb.	.0275 @	.0625
Bone, powdered	lb.	.05½ @	.14
Carbon, compressed	lb.	.0275 @	.0625
uncompressed	lb.	.0275 @	.0625
"Certified"	lb.	— @	—
"Spherons"	lb.	— @	—
"Disperso"	lb.	.0275 @	.0625
"Excello," compressed	lb.	.0275 @	.0625
"Fumonex"	lb.	.03 @	.05
"Gastex"	lb.	.03 @	.05
Lampblack	lb.	.07 @	.12
"Micronex"	lb.	.0275 @	.0625
"Supreme"	lb.	.0275 @	.0625
Thermatomic—"P 33"	lb.	.04¾ @	.07¾
"Thermax"	lb.	.01¾ @	.05
United "Dixie" & "Kosmos"	lb.	.0275 @	.0625

COMPOUNDING MATERIALS

Aluminum Flake	ton.	21.85 @	24.50
Ammonia carbonate, lump	lb.	.10½ @	.12
Asbestine	ton	13.00 @	15.00
Barium carbonate (98-100%)	ton	— @	—
Barium Dust	lb.	.05 @	.06
Barytes	ton	23.65 @	31.15
Bentonite	lb.	.02 @	.03
Blanc fixe dry f.o.b. works	ton	60.00 @	65.00
Calcene	ton	37.50 @	45.00
Catalpo (fact.)	lb.	.02 @	—
Chalk, precipitated			
Suprex white, extra lt.	ton	45.40 @	60.00
heavy	ton	45.00 @	55.00
Clay, Kaolin, domestic	ton	7.50 @	15.00
Aerfloted, Suprex	ton	9.50 @	21.00
Congaree	ton	9.50 @	—
Crown (f.o.b. plant)	ton	9.50 @	—
Dixie	ton	11.00 @	26.00
Dixie, Jr.	ton	9.50 @	24.00
McNamee	ton	9.50 @	22.00
Par	ton	9.50 @	22.00
Witco	ton	9.50 @	—
Cotton Flock (Dark)	lb.	.10 @	.12
Glues, extra white	lb.	.28 @	.30
medium white	lb.	.14 @	19
Kalite No. 1	ton	24.00 @	50.00
Kalite No. 3	ton	34.00 @	60.00
"Lime Crest" Industrial Filler No. 100	lb.	— @	—
Magnesium carbonate	lb.	.07½ @	—
Mica	ton	35.00 @	44.00
Pyrax A	ton	6.00 @	20.00
Rottenstone (powdered)	lb.	.02½ @	.05
Soapstone, powdered	ton	16.00 @	22.00
Starch, powdered	cwt.	2.90 @	4.10
Talc, domestic	ton	17.00 @	20.00
Whiting, commercial	ton	17.00 @	18.00
Columbia Filler	ton	9.00 @	14.00
English Cliffstone	ton	33.00 @	43.00
Witco	ton	6.00 @	—
Wood Flour	ton	20.00 @	25.00
Zinc Carbonate	lb.	— @	.10¾
Zinc Stearate	lb.	.23 @	—

MINERAL RUBBER

285°-300° Mineral Rubber	ton	22.00 @	42.00
Black Diamond	ton	27.00 @	—
Genasco, solid (factory)	ton	25.00 @	27.00
Hard Hydrocarbon	ton	22.00 @	42.00
Parmr, solid	ton	25.00 @	—
Pioneer, MR, solid	ton		
Pioneer-granulated	ton		

MISCELLANEOUS

Aromatics—Rodo #0	lb.	3.50 @	4.00
Rodo #10	lb.	4.50 @	5.00
Curodex 19	lb.	2.75 @	—
Curodex 188	lb.	3.50 @	—
Curodex 198	lb.	4.50 @	—
Para-Dors No. 5145	lb.	2.00 @	—
Aresklene No. 375 (dispersing, wetting and penetrating agent)	lb.	.35 @	.50
Darvan (dispersing agent)	lb.	.25 @	.47
Santomerse S (dispersing, wetting, penetrating and stabilizing agent)	lb.	.11 @	.25
Sunproof	lb.	.20 @	.25
Sponge Paste	lb.	— @	.18
Tackol (tackifier)	lb.	.085 @	.18
Tonox	lb.	.52 @	.61

SOFTENERS

Acids			
Acetic, 28%, bbls.	100 lb.	2.53 @	2.78
Nitric, 36 degrees	cwt.	5.00 @	6.00
Sulfuric, 66 degrees	ton	15.50 @	16.50
Acids, Fatty			
Laurex	lb.	.10½ @	.13
SL #10	lb.	.12 @	.14
Stearex Beads	lb.	.08 @	.09
Stearic, double pressed	lb.	.12½ @	.13½
Stearite	lb.	.10½ @	.11¾
Alkalies			
Caustic Soda, 76%	cwt.	2.70 @	3.55
Soda Ash, 58%, C.L.	cwt.	— @	2.35
Oils			
Cycline Oil	gal.	.14 @	.20
Degras, bbls.	lb.	.07¾ @	.08
Fluxrite	lb.	.05½ @	.06½
Palm Niger	lb.	.05½ @	.06½
Para-Flux	gal.	.17 @	.18
Para Lube	lb.	— @	.05
Petrolatum, light	lb.	.03½ @	.03¾
Pigmentaroil, tank cars	gal.	.16 @	—
in drums	gal.	.22½ @	.23½
Pine, steam distilled	gal.	.64 @	.69
Rosin Oil, cmpd.	gal.	.40 @	—
Rubberol, f.o.b. Chicago	lb.	.13½ @	.14
Rubtack	lb.	.08 @	.10
Seedine, c.l.	lb.	.07½ @	—
Tackol	lb.	.08½ @	.18
Witco Palm Oil	lb.	.07 @	—
Witco Softener No. 20	gal.	.20 @	—
Woburn No. 8, c.l.	lb.	.06 @	—
Wobonite, c.l.	lb.	.05 @	—
Resins and Pitches			
Pitch, Burgundy	lb.	.05½ @	.06½
coal tar	ton	19.00 @	22.00
hardwood	ton	16.00 @	22.50
pine, 200 lb. gr. wt.	bbl.	6.00 @	6.50
Pigmentar, tank cars	gal.	.16 @	—
in drums	gal.	.22½ @	.23½
R. S. L. Resin	lb.	— @	—
Retort Pine Tar, drums	ton	20.00 @	26.00
Solvents			
Acetone, pure	lb.	— @	.06¼
Alcohol, denatured, methanol, No. 1 bbls.	gal.	.33 @	.39
Benzene, 90%	gal.	.18 @	.23
Beta-Trichlorethane	gal.	— @	.20
Bondogen	lb.	.98 @	1.50
Carbon, bisulfide	lb.	.05¼ @	.08
Carbon tetrachloride	gal.	.73 @	1.065
Dichlorethylene	lb.	— @	.25
Dipentene, cml., drums	gal.	.41 @	.50
Ethylene dichloride	lb.	.05½ @	.06¼
Plastogen	lb.	.07¾ @	.12½
Reogen (drums)	lb.	.11½ @	.20
Rub-Sol (f.o.b. Okla.)	gal.	.09 @	—
Trichlorethylene	lb.	— @	.08½
Turpentine, spirits	gal.	.43 @	.47
dest. dist., drums	gal.	.33 @	.41
Waxes			
Beeswax, white	lb.	.39 @	.45
Carnauba, yellow	lb.	.46 @	.47½
Ceresin, white, dom.	lb.	.08 @	.11
Montan, crude	lb.	.10¾ @	.11¼
Paraffin (c.l.—f.o.b. N. Y.)			
Yellow crude scale	lb.	.02¾ @	—
White crude scale 124/126	lb.	.02¾ @	.03
Refined, 122/127	lb.	.04½ @	—

ANTI-OXIDANTS

Agerite Alba	lb.	1.50 @	1.95
Exel	lb.	1.00 @	1.40
Gel	lb.	.57 @	.73
Hipar	lb.	.65 @	.92
Powder	lb.	.52 @	.64
Resin	lb.	.52 @	.64
Resin D	lb.	.52 @	.64
White	lb.	1.25 @	1.60
Albasan	lb.	.70 @	.75
Antox	lb.	.56 @	.58
B-L-E	lb.	.52 @	.61
Flectol B	lb.	.52 @	.65
Flectol H	lb.	.52 @	.65
Flectol White	lb.	.90 @	1.15
Neozone	lb.	.52 @	.63
Oxynone	lb.	.64 @	.80
Retardex	lb.	.35 @	.40
Santoflex B	lb.	.52 @	.65
Santovar A	lb.	1.15 @	1.40
S.C.R.	lb.	.33 @	.35
Stabilite	lb.	.52 @	.54
Stabilite Alba	lb.	.70 @	.75
VGB	lb.	.52 @	.61

MOLD LUBRICANTS

Aresklene	lb.	.35 @	.50
Cocoa Soapstock	lb.	.06 @	.08
Dipex	lb.	.06 @	.08
Lubrex	lb.	.?? @	.30
Mold Paste	lb.	.12 @	.18
Rubberol, f.o.b. Chicago	lb.	.13½ @	.14
Rusco, f.o.b. Nitro	lb.	.12 @	.30
Sericite, f.o.b. N. Y.	ton	65.00 @	—
Soap Tree Bark, cut, sifted	lb.	.06 @	.08

FACTICE OR RUBBER SUBSTITUTES

Amberex	lb.	.17 @	—
Black	lb.	.07 @	.11
White	lb.	.07¾ @	.11
Brown	lb.	.07 @	.09¼
Neophax	lb.	.09¼ @	—

VULCANIZING INGREDIENTS

Dispersed Sulfur No. 2	lb.	.07½ @	.15
Sulfur Chloride, yellow (drs.)	lb.	.04 @	—
Sulfur flour,			
Refined, 100% pure (bags)	cwt.	2.50 @	3.65
Commercial (bags)	cwt.	1.60 @	2.35
Telloy	lb.	1.75 @	—
Vandex	lb.	1.75 @	—

Crude Rubber
Latex and Guayule
Reclaimed Rubber
Tires and Tubes

STATISTICS OF THE INDUSTRY

Rim Production
Automobiles
Gasoline
Cotton Prices

U. S. Imports and Exports of Crude Rubber

YEARS	Gross Imports: Long Tons	Gross Imports: Total Declared Value	Gross Imports: Average Declared Value per pound Cents	Re-exports: Long Tons	Re-exports: Total Declared Value	Re-exports: Average Declared Value per pound Cents	Net Imports: Long Tons
1924	325,899	173,367,272	23.75	10,309	6,057,637	26.23	315,590
1925	393,370	426,167,504	48.36	14,827	19,847,753	59.76	378,543
1926	409,944	501,131,064	54.57	17,671	22,470,583	56.77	392,273
1927	424,733	338,688,492	35.60	27,775	24,735,488	39.76	396,958
1928	432,633	242,727,423	25.05	32,159	18,128,761	25.17	400,474
1929	560,082	239,177,811	19.06	36,485	16,868,718	20.64	523,597
1930	482,083	139,133,048	12.88	30,205	9,310,205	13.76	451,878
1931	497,176	72,922,845	6.55	25,595	4,255,572	7.42	471,581
1932	409,556	31,936,459	3.48	20,930	2,015,612	4.30	388,626
1933	407,817	44,034,064	4.82	20,537	2,601,352	5.65	387,280
1934	449,513	97,929,676	9.73	23,848	5,770,109	10.80	425,665
1935	453,134	115,299,448	11.36	11,389	3,084,331	12.09	441,745
1936	467,064	152,072,496	14.54	12,581	4,488,223	15.93	454,483
1937	574,600	237,307,041	18.44	7,902	3,385,433	19.02	566,698
1938	397,620	125,357,730	14.07	5,652	1,799,124	14.21	391,968
1938:							
July	21,771	5,723,381	11.74	420	127,522	13.54	21,351
Aug.	30,798	8,477,231	12.29	432	133,350	13.79	30,366
Sept.	34,383	10,650,107	13.83	803	242,324	13.48	33,580
Oct.	33,449	10,945,896	14.61	621	196,523	14.14	32,828
Nov.	31,903	10,372,345	14.79	415	146,276	15.73	31,488
Dec.	36,031	12,601,926	15.61	424	141,364	14.87	35,607
1939							
Jan.	35,255	12,313,006	15.59	468	165,663	15.79	34,787
Feb.	29,109	10,269,224	15.75	460	152,113	14.76	28,649
Mar.	43,490	15,058,279	15.46	439	171,279	17.43	43,051
Apr.	30,836	10,400,125	15.06	440	151,644	15.38	30,396
May	42,998	15,041,433	15.62	496	180,091	16.20	42,502
June	32,437	11,403,150	15.69	413	147,910	16.00	32,024
July	34,288	12,071,105	15.72	440	164,428	16.69	33,848

* Revised.

Note: "Gross Imports" do not include latex or guayule. To secure more accurate figures for "Net Imports" latex and guayule figures (shown below) should be added and the re-export figure deducted from the total. Annual figures for 1922, however, include both latex and guayule; guayule only is included in 1923. Annual figures for 1922-36 were revised in February, 1937.

United States Imports of Guayule, Balata, Jelutong, Liquid Latex

(All Quantities in Long Tons)

	Guayule Tons	Guayule Dollars	Balata Tons	Balata Dollars	Jelutong Tons	Jelutong Dollars	Liquid Latex (1) Tons	Liquid Latex (1) Dollars
1924	1,356	536,392	464	568,456	6,165	1,237,100	2,157	864,059
1925	3,781	1,803,448	517	574,750	6,749	1,642,531	3,272	3,537,510
1926	4,305	2,562,096	354	327,213	7,263	3,127,757	3,394	4,686,743
1927	5,018	2,674,957	582	477,246	7,785	2,448,657	1,495	1,170,650
1928	3,077	1,755,685	731	430,855	7,552	2,540,059	4,007	2,121,786
1929	1,275	545,175	728	566,964	8,204	2,458,126	3,729	1,788,391
1930	1,096	347,388	502	422,684	5,907	1,403,244	4,458	1,508,786
1931	....	.....	1,207	411,380	5,777	1,019,010	4,675	888,909
1932	....	.....	707	147,403	4,607	616,596	5,112	601,999
1933	....	.....	1,659	2,261,869	5,990	944,895	11,085	1,833,671
1934	398	75,349	1,054	438,209	4,987	943,752	13,107	3,643,221
1935	459	86,835	615	188,384	5,644	1,063,126	13,553	3,782,232
1936	1,229	286,552	535	199,368	6,163	1,296,364	19,852	6,659,899
1937	2,694	745,873	354	151,344	7,109	2,017,786	23,185	10,213,670
1938	2,485	623,819	509	181,140	9,132	2,944,504	11,878	4,147,318
1938:								
July	223	49,099	51	16,130	869	267,491	634	209,526
Aug.	250	53,285	41	13,637	526	159,784	876	308,373
Sept.	173	37,954	39	13,896	740	225,161	683	235,242
Oct.	126	27,692	45	20,641	614	163,635	876	347,348
Nov.	59	12,923	66	24,725	307	76,452	1,020	394,082
Dec.	181	39,869	13	6,263	917	237,653	1,263	479,966
1939:								
Jan.	226	49,580	61	20,417	843	203,753	1,602	599,927
Feb.	212	46,576	15	4,426	510	129,726	1,717	657,565
Mar.	229	39,520	14	5,215	641	136,112	2,005	731,302
Apr.	180	24,584	59	18,170	281	72,024	1,018	360,739
May	102	22,347	56	16,359	645	161,745	2,786	1,067,682
June	91	19,879	119	33,876	597	122,087	1,836	694,863
July	150	32,626	39	18,813	663	141,540	2,934	1,064,927

(1) Weight given in pounds of dry rubber contained in latex.

Note: Annual figures for 1924-1936 revised on basis of information received on February 8, 1937.

U. S. Consumption of Crude Rubber

(Rubber Manufacturers' Association statistics raised to 100 per cent—All figures in long tons)

	Figures on Monthly Basis: 1932*	1933*	1934*	1935*	1936*	1937*	1938*	1939
Jan.	29,648	22,645	39,190	46,636	48,631	50,879	31,265	46,234
Feb.	31,821	21,392	40,515	42,720	36,841	51,950	25,357	42,365
Mar.	29,505	17,843	47,003	42,153	42,813	54,129	32,389	50,165
Apr.	27,518	25,928	44,853	44,247	52,031	51,859	29,730	44,166
May	30,957	44,074	42,918	41,101	50,612	51,795	30,753	44,377
June	41,475	50,743	40,147	36,156	52,772	51,860	32,540	47,259
July	29,976	49,614	32,553	35,917	48,250	43,703	34,219	43,880
Aug.	23,721	44,428	33,216	38,775	46,777	41,506	40,552	
Sept.	23,847	35,281	30,258	37,086	46,449	43,945	40,183	
Oct.	22,286	31,543	31,253	41,969	49,637	38,754	42,850	
Nov.	23,231	28,831	34,748	42,310	50,433	34,025	49,050	
Dec.	18,015	28,757	36,569	42,474	49,754	29,195	48,143	
Tot.	332,000	401,079	453,223	491,544	575,000	543,600	437,031	

* Revised.

Note: All figures are now based on Department of Commerce survey figures.

Reclaimed Rubber in the United States

(All Quantities in Long Tons)

Year	Production	Consumption Tons	Consumption % to Crude	Stocks*	Year	Production	Consumption Tons	Consumption % to Crude	Stocks*
1929	218,954	226,588	48.4	27,464	1934	110,010	100,597	22.2	23,079
1930	157,967	153,497	40.8	22,000	1935	122,948	113,078	23.0	25,069
1931	133,351	124,126	33.9	19,257	1936	150,571	141,486	24.6	19,000
1932	75,608	77,504	23.4	16,354	1937*	185,033	162,000	29.8	28,800
1933	99,560	81,602	19.9	20,746	1938*	122,403	120,800	27.6	23,000

	Figures on Monthly Basis: Production	Consumption Tons	Consumption % to Crude	Stocks*		Production	Consumption Tons	Consumption % to Crude	Stocks*
1938:*									
Jan.	8,303	7,463	23.9	28,982	July	7,668	8,777	25.6	18,956
Feb.	6,685	7,679	30.3	27,518	Aug.	11,295	11,387	28.1	18,307
Mar.	7,416	9,109	28.1	25,366	Sept.	12,961	11,969	29.8	18,540
Apr.	6,902	8,043	27.1	23,799	Oct.	14,624	12,522	29.2	19,910
May	7,406	8,613	28.0	22,042	Nov.	15,095	13,440	27.4	21,001
June	8,180	8,779	27.0	20,785	Dec.	15,868	13,019	27.1	23,000
1939:									
Jan.	13,763	13,000	28.1	21,960	July	12,588	13,542	30.9	21,339
Feb.	13,093	12,626	29.8	21,390	Aug.	.....	.....	...	.....
Mar.	14,528	15,322	30.5	19,955	Sept.	.....	.....	...	.....
Apr.	14,527	13,391	30.3	22,628	Oct.	.....	.....	...	.....
May	14,769	13,517	30.5	22,771	Nov.	.....	.....	...	.....
June	15,871	14,870	31.4	23,058	Dec.	.....	.....	...	.....

a Stocks on hand at the end of month or year.
* Revised.

Note: Figures for 1938 were revised on June 1, 1939, and are now based on Department of Commerce survey figures.

U. S. Consumption of Gasoline

(Bureau of Mines Statistics)
(In Thousands of Barrels of 42 Gallons)

	1937*	1938	1939		1937*	1938	1939
January	33,668	35,176	37,847	August	49,598	50,459	.....
February	32,034	31,861	34,595	September	47,515	46,058	.....
March	40,524	41,259	42,520	October	45,446	46,272	.....
April	43,461	43,254	43,977	November	42,718	44,991	.....
May	45,407	44,911	49,547	December	39,465	41,649	.....
June	48,447	48,293	49,812				
July	51,069	47,474	50,508	Total	519,352	521,657	.....

* Revised.

Rims Inspected and Passed in U. S.

(Tire and Rim Association Reports)

	Total		Total		Total
1927	19,700,003	1931	11,253,800	1935	18,664,356
1928	24,247,282	1932	6,261,336	1936	20,790,192
1929	24,141,502	1933	8,713,962	1937	22,237,964
1930	17,364,096	1934	12,255,118	1938	10,612,138

1939		1939		1939	
January ...	1,714,137	May	1,243,519	September .	.....
February ..	1,442,535	June	1,019,626	October ...	.....
March	1,730,211	July	681,434	November .	.....
April	1,348,335	August	.....	December .	.....

Daily Spot Closing Prices of Ribbed Smoked Sheet Rubber—*New York Market, in Cents per Pound*

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Ave.
1937																																
May	21	—	21	21⅞	21⅝	21⅛	21⅛	22⅝	—	21⅝	21⅝	21⅝	20⅞	20⅛	20⅛	—	20⅛	20⅛	20⅛	20⅛	21⅛	21⅛	—	21	20⅝	20⅜	20⅛	20⅛	—	—	—	21⅜
June	20⅜	20⅛	19⅞	19⅛	—	19⅛	18⅝	19⅛	18⅝	18⅛	18⅛	19	18⅞	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	18⅞	19⅛	19⅛	19⅛	19⅛	19⅛	19⅛	18⅞	18⅛	18⅛	18⅝	—	19⅛
July	19⅜	19⅛	18⅞	18⅝	18⅛	18⅛	18⅛	19⅛	18⅛	18⅛	18⅛	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝
Aug.	18⅜	18⅛	18⅛	18⅛	18⅛	18⅛	18⅛	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝
Sept.	18⅛	18⅛	18⅛	18⅛	18⅛	18⅝	18⅝	19⅛	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝	18⅝
Oct.	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝	17⅝
Nov.	15⅛	14⅜	14⅜	14⅜	14⅜	14⅜	14⅜	14⅜	14⅜	14⅜	14⅜	14⅜	14⅜	14⅜	14⅜	14⅜	14⅜	14⅜	14⅜	14⅜	14⅜	14⅜	14⅜	14⅜	14⅜	14⅜	14⅜	14⅜	14⅜	14⅜	14⅜	14⅜
Dec.	15⅛	15⅛	15⅛	15⅛	—	15⅛	15⅛	15⅛	14	15⅛	15⅛	15⅛	15⅛	15	15	15	15	15	15	15	15⅛	15⅛	15	14⅛	14⅛	14⅛	15	14⅛	14⅛	14⅛	14⅛	14⅝
1938																																
Jan.	—	—	—	14⅝	14⅝	14⅝	14⅝	14⅝	—	14⅝	14⅝	14⅝	—	14⅝	14⅝	—	14⅝	14⅛	14⅛	14⅛	14⅛	14⅛	—	14⅛	14⅛	14⅛	14⅛	14⅛	14⅛	—	14⅛	14⅜
Feb.	14⅞	14⅞	14⅞	14⅞	14⅝	—	14⅝	14⅝	14⅝	14⅝	14⅝	—	—	14⅝	14⅝	14	14	14	14	14	13⅝	13⅝	13⅝	13⅝	13⅝	13⅝	13⅝	13⅝	13⅝	13⅝	13⅝	14⅛
Mar.	14⅜	14⅜	14⅜	14⅜	14⅜	14⅜	14⅜	14⅜	14⅜	14⅜	14⅜	14⅜	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝	12⅝	13⅛
April	10⅜	10⅜	10⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜
May	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜	11⅜
June	15⅛	—	—	—	14⅜	—	—	—	—	12	—	12	—	14⅜	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛	15⅛
July	15⅛	—	—	15⅛	16	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛
August	15⅛	—	—	15⅛	17	16⅛	16⅛	17⅛	16⅛	16⅛	17⅛	17⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛
September	19⅛	18⅜	—	—	16⅛	15⅛	15⅛	15⅛	15⅛	16	—	15⅛	15⅛	16	16	16	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛
1939																																
Jan.	—	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝	15⅝
Feb.	—	15⅝	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛
March	—	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛	16⅛
April	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
May	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
June	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
July	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
August	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
September	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Average Spot Closing Prices— Ribbed Smoked Sheets

(New York Markets)

Average Price per Pound for Years 1911-1931

Year	Cents	Year	Cents	Year	Cents	Year	Cents	Year	Cents
1912	121.60	1916	72.50	1920	36.30	1924	26.20	1928	22.48
1913	82.04	1917	72.23	1921	16.36	1925	72.46	1929	20.55
1914	65.33	1918	60.15	1922	17.50	1926	48.50	1930	11.98
1915	65.85	1919	48.70	1923	29.45	1927	37.72	1931	6.17

Average Monthly Price per Pound Since 1932

	1932 Cents	1933 Cents	1934 Cents	1935 Cents	1936 Cents	1937 Cents	1938 Cents	1939 Cents
Jan.	4.38	3.08	9.32	13.10	14.35	21.37	14.63	15.75
Feb.	4.03	2.95	10.45	12.92	15.48	21.33	14.71	15.93
Mar.	3.35	3.01	11.01	11.51	15.89	24.09	13.55	16.26
Apr.	3.02	3.56	12.10	11.55	15.98	23.44	11.84	15.87
May	3.09	4.95	13.26	12.05	15.62	21.14	11.57	16.07
June	2.66	6.15	13.51	12.57	15.85	19.29	12.57	16.37
July	2.89	8.01	14.60	12.10	16.49	18.86	15.37	16.51
Aug.	3.63	7.31	15.47	11.98	16.25	18.37	16.08	16.67
Sept.	3.84	7.30	15.36	11.55	16.46	18.55	16.15	
Oct.	3.65	7.64	13.96	12.62	16.55	16.28	16.89	
Nov.	3.44	8.66	13.04	13.15	17.97	14.60	16.24	
Dec.	3.24	8.87	12.98	13.28	20.01	15.41	16.05	
Average for Year	3.49	5.96	12.92	12.37	16.41	19.39	14.64	

London Closing Prices of Ribbed Smoked Sheets

(In Pence Per Pound)

Day	1939 June	1939 July	1939 Aug.	1939 Sept.	Day	1939 June	1939 July	1939 Aug.	1939 Sept.
1	8 1/16	—	8 1/16	—	17	—	8 1/16	8 1/16	
2	8 1/16	—	8 3/16	—	18	—	8 3/16	8 3/16	
3	—	8 1/16	8 1/16	—	19	8 1/16	8 1/16	—	
4	—	8 1/16	8 1/2	—	20	8 1/16	8 1/16		
5	8 1/16	8 1/16	—	—	21	8 1/16	8 3/16	8 3/16	
6	8 1/16	8 1/16	—	—	22	8 1/16	—	8 3/16	
7	8 1/16	8 1/16	—	10 3/16	23	8 1/16	—	8 1/2	
8	8 1/16	—	8 1/2	9 1/2	24	—	8 3/16	8 1/2	
9	8 1/16	—	8 1/2	—	25	—	8 1/16	8 1/16	
10	—	8 1/16	8 1/2		26	8 1/16	8 1/16	—	
11	—	8 1/16	8 1/2		27	8 1/16	8 1/16		
12	8 1/16	8 1/16	—		28	8 1/16	8 3/16	8 3/16	
13	8 1/16	8 1/16	—		29	8 1/16	—	8 3/16	
14	8 3/16	8 1/16	8 1/16		30	8 1/16	—	8 1/16	
15	8 1/16	—	8 1/16		31	—	8 1/16	8 1/16	
16	8 1/16	—	8 1/2						

Average Monthly Price Per Pound

Month	1936 Pence	1937 Pence	1938 Pence	1939 Pence	Month	1936 Pence	1937 Pence	1938 Pence	1939 Pence
Jan.	6.758	10.378	7.077	7.926	Aug.	7.581	8.830	7.841	8.545
Feb.	7.255	10.503	7.029	7.942	Sept.	7.577	8.935	7.918	
Mar.	7.450	11.766	6.590	8.120	Oct.	7.898	7.855	8.355	
Apr.	7.502	11.471	5.793	7.910	Nov.	8.572	7.080	8.111	
May	7.335	10.250	5.632	8.002	Dec.	9.580	7.332	8.005	
June	7.352	9.548	6.147	8.216	Average for Year	7.713	9.424	7.164	
July	7.696	9.136	7.464	8.271					

Spot Closing Cotton Prices

(Middling Upland Grade—New York Market)

Recent Daily Price Per Pound

Date	1939 July	1939 Aug.	1939 Sept.	Date	1939 July	1939 Aug.	1939 Sept.	Date	1939 July	1939 Aug.	1939 Sept.
1	9.75	9.81	8.92	11	9.98	9.39		22	9.44	9.27	
2	—	9.69	8.87	12	9.89	9.33		23	—	9.10	
3	9.87	9.64	—	13	9.85	—		24	9.54	9.17	
4	—	9.55	—	14	9.77	9.29		25	9.68	9.11	
5	9.82	9.55	9.25	15	9.69	9.29		26	9.75	9.04	
6	9.83	—	9.49	16	—	9.24		27	9.68	—	
7	9.96	9.60	10.00	17	9.58	9.27		28	9.58	8.82	
8	9.87	9.47	9.82	18	9.39	9.32		29	9.65	8.91	
9	—	9.53	9.35	19	9.49	9.22		30	—	8.82	
10	10.02	9.47		20	9.34	—		31	9.78	8.91	
				21	9.44	9.19					

Average Monthly Price Per Pound

	1936 Cents	1937 Cents	1938 Cents	1939 Cents		1936 Cents	1937 Cents	1938 Cents	1939 Cents
Jan.	11.91	13.06	8.57	8.94	Aug.	12.28	10.41	8.41	9.30
Feb.	11.53	13.15	8.91	8.97	Sept.	12.31	9.02	8.17	
Mar.	11.43	14.46	8.92	9.00	Oct.	12.30	8.42	8.61	
Apr.	11.71	14.23	8.76	8.87	Nov.	12.23	7.96	9.08	
May	11.68	13.34	8.50	9.56	Dec.	12.83	8.26	8.72	
June	12.02	12.70	8.38	9.88	Average for Year	12.11	11.44	8.66	
July	13.11	12.26	8.85	9.71					

Stocks of Crude Rubber

(All figures are in long tons)

ON HAND OR AFLOAT TO THE U. S.

End of:	ON HAND 1937	ON HAND 1938*	ON HAND 1939	AFLOAT 1937	AFLOAT 1938	AFLOAT 1939	ON HAND AND AFLOAT 1937	ON HAND AND AFLOAT 1938*	ON HAND AND AFLOAT 1939
Jan.	204,436	276,497	237,826	55,096	57,356	48,210	259,532	333,853	286,036
Feb.	195,692	292,067	231,475	53,538	47,459	55,814	249,230	339,526	287,289
Mar.	192,980	301,762	205,936	56,994	41,882	55,981	249,974	343,644	261,917
Apr.	176,289	303,901	190,896	72,530	39,071	57,918	248,819	342,972	248,814
May	175,273	300,907	193,602	58,542	32,859	54,046	233,815	333,766	247,648
June	172,056	294,796	181,794	57,215	32,079	51,274	229,271	326,875	233,068
July	167,094	282,785	174,240	75,779	40,400	52,990	242,873	323,185	227,230
Aug.	174,195	273,841		80,439	47,772		254,634	321,613	
Sept.	186,193	268,094		83,288	48,927		269,481	317,021	
Oct.	200,025	259,074		80,653	50,162		280,678	310,136	
Nov.	222,707	242,592		81,302	51,114		304,009	293,706	
Dec.	262,204	231,500		63,099	45,105		325,303	276,605	

* Revised.

STOCKS IN GREAT BRITAIN

(No. of Tons in Wharves and Warehouses, not including Latex)

At end of	London 1937	London 1938	London 1939	Liverpool 1937	Liverpool 1938	Liverpool 1939
January	29,005	40,203	51,420	41,895	21,711	28,789
February	26,508	46,596	48,312	37,078	24,737	26,784
March	21,292	50,233	46,768	30,622	26,220	24,996
April	21,128	54,296	44,760	27,443	28,277	23,742
May	21,351	57,194	43,454	25,081	29,862	22,211
June	21,964	60,307	42,374	21,258	31,837	21,176
July	22,589	62,236	37,772	19,424	32,825	19,116
August	25,211	65,113		19,817	34,315	
September	28,462	63,321		21,190	34,645	
October	30,465	59,609		21,327	33,483	
November	33,304	57,794		21,399	32,116	
December	35,633	55,668		21,978	31,012	

(Figures from the Rubber Trade Association of London)

STOCKS IN OTHER CENTRES

(Figures from Statistical Bulletin of the Int'l Rubber Regulation Committee)

	Penang and Singapore [1]	Malaya [2]	Ceylon [3]	Holland	Para and Manaos
At end of 1938					
July	45,529	52,081	5,014	711	944
August	41,002	49,922	4,659	672	1,032
September	35,386	53,815	5,339	662	1,599
October	34,901	54,720	4,916	669	1,796*
November	31,255	54,283	4,409	349	2,267
December	27,084	57,860	6,120	268	1,864
At end of 1939					
January	30,975	59,155	4,827	198	1,557
February	28,559	59,399	4,318	183	1,826
March	23,255	58,005	3,389	137	2,244*
April	22,434	55,238	3,648	131	2,209
May	20,849	53,434	4,005	136	1,966
June	19,585	.....	3,771	101	1,821

[1] Dealers' and Port Stocks. [2] Inside Regulated Areas. [3] Dealers' Stocks Only.
* Revised.

RUBBER STOCKS AFLOAT

	Afloat for United States	Afloat for Europe	All Other * Afloat	Total * Afloat
End of: 1938				
June	32,079	42,580	17,341	92,000
July	40,400	39,150	25,450	105,000
August	47,772	34,500	18,728	101,000
September	48,927	29,200	17,873	96,000
October	51,062	26,100	21,838	99,000
November	51,114	26,700	14,186	92,000
December	45,105	26,800	8,095	80,000
End of: 1939				
January	48,210	27,900	28,890	105,000
February	55,814	28,300	21,886	106,000
March	55,981	25,200	20,819	102,000
April	57,918	27,200	13,882	99,000
May	54,046	25,700	16,254	96,000
June	51,274	23,000	13,726	88,000
July	52,990	27,000	24,010	104,000

* *Total Afloat* is an arbitrary estimate based on 1½ months' shipments as adopted by the Department of Commerce. *All Other Afloat* is determined by subtracting the amount of stocks in transit to the United States and Europe from the estimated total.
P—Preliminary estimate

TOTAL PRINCIPAL WORLD STOCKS

(Figures from the Survey of Current Business)

At End of:	1934	1935	1936	1937*	1938*	1939
January	661,948	698,153	600,479	454,249	549,762	497,665
February	663,308	686,195	599,355	445,265	565,833	479,578
March	666,382	678,809	583,318	447,856	586,666	460,723
April	658,796	677,006	567,172	428,249	586,291	438,252
May	689,239	677,569	541,871	413,134	568,158	429,979
June	672,804	671,525	520,255	434,250	573,136	407,640
July	676,200	679,061	519,074	445,782	580,654	417,639
August	674,702	680,644	500,520	457,462	565,394	.....
September	694,361	661,509	493,585	470,768	551,447	.....
October	680,616	655,000	486,159	479,398	540,976	.....
November	684,408	617,300	466,491	493,266	512,196	.....
December	705,975	613,987	466,576	545,533	482,852	.....
Monthly Avge.	677,395	666,397	528,738	460,022	555,280	.....

* Revised.

U. S. Tire and Tube Statistics[1]

(All Figures Represent Thousands)

AUTOMOBILE CASINGS

Production Figures on Quarterly Basis — Quarter	1932	1933	1934	1935	1936*	1937*	1938*	1939
Jan.-Mar.	11,004	6,635	13,437	13,355	11,376	15,565	7,532	13,702*
Apr.-June	12,980	14,412	13,565	12,597	14,892	15,834	8,353	13,490*
July-Sept.	9,245	14,707	9,822	11,312	14,914	12,207	11,240	
Oct.-Dec.	6,856	9,550	10,406	12,099	14,858	9,704	13,052	
Total	40,085	45,304	47,230	49,363	56,040	53,310	40,182	

Shipment Figures on Quarterly Basis — Quarter	1932	1933	1934	1935	1936*	1937*	1938*	1939
Jan.-Mar.	8,760	6,981	10,730	11,154	10,554	14,143	7,534	12,156*
Apr.-June	18,021	15,139	14,998	13,473	15,940	15,741	10,363	14,908*
July-Sept.	8,141	13,707	11,648	13,489	14,037	13,106	11,748	
Oct.-Dec.	5,329	8,265	9,310	12,066	12,855	10,495	12,685	
Total	40,251	44,092	46,686	50,182	53,386	53,485	42,330	

Inventory Figures [2] — Quarter	1932	1933	1934	1935	1936*	1937*	1938*	1939
Jan.-Mar.	9,878	7,290	11,651	11,675	8,762	12,004	10,521	10,248*
Apr.-June	4,999	6,615	10,219	10,755	7,556	12,081	8,470	8,909*
July-Sept.	6,096	7,595	8,419	8,288	8,690	11,200	8,022	
Oct.-Dec.	7,644	8,888	9,455	8,196	10,717	10,383	8,451	

Figures for Recent Months

	PRODUCTION 1937	PRODUCTION 1938	PRODUCTION 1939	SHIPMENTS 1937	SHIPMENTS 1938	SHIPMENTS 1939	INVENTORY [2] 1937	INVENTORY [2] 1938	INVENTORY [2] 1939
July	4,138	3,287	4,510	5,005	3,870	5,056	11,238	8,041	8,300
Aug.	3,841	4,038		4,711	3,991		10,427	8,217	
Sept.	4,227	3,916		3,390	3,888		11,200	8,022	

AUTOMOBILE INNER TUBES

Production Figures on Quarterly Basis — Quarter	1932	1933	1934	1935	1936*	1937*	1938*	1939
Jan.-Mar.	10,721	6,230	12,823	12,553	11,891	15,831	7,314	12,385*
Apr.-June	11,913	13,001	13,191	11,631	14,624	15,413	7,380	12,067*
July-Sept.	8,286	14,356	10,321	11,270	15,320	12,038	10,794	
Oct.-Dec.	5,970	9,000	9,891	12,425	15,201	9,092	12,360	
Total	36,890	42,587	46,226	47,879	57,036	52,374	37,848	

Shipment Figures on Quarterly Basis — Quarter	1932	1933	1934	1935	1936*	1937*	1938*	1939
Jan.-Mar.	8,918	6,539	10,640	11,252	11,367	14,606	7,387	11,371*
Apr.-June	16,271	13,292	14,553	11,928	15,113	15,495	9,564	13,233*
July-Sept.	7,761	13,370	11,545	13,251	15,069	12,901	11,243	
Oct.-Dec.	4,961	8,189	8,306	11,636	12,874	9,765	12,099	
Total	37,911	41,390	45,044	48,067	54,423	52,767	40,239	

Inventory Figures [2] — Quarter	1932	1933	1934	1935	1936*	1937*	1938*	1939
Jan.-Mar.	9,448	6,369	10,244	10,406	8,660	11,993	10,547	9,163*
Apr.-June	5,174	6,097	8,795	10,050	8,075	11,833	8,337	8,044*
July-Sept.	5,753	7,008	7,639	7,565	8,595	11,326	7,859	
Oct.-Dec.	6,749	7,815	9,180	8,231	10,945	10,312	8,166	

Figures for Recent Months

	PRODUCTION 1937	PRODUCTION 1938	PRODUCTION 1939	SHIPMENTS 1937	SHIPMENTS 1938	SHIPMENTS 1939	INVENTORY [2] 1937	INVENTORY [2] 1938	INVENTORY [2] 1939
July	4,049	2,936	4,043	5,084	3,519	4,285	10,950	7,723	7,819
Aug.	3,914	4,026		4,721	3,744		10,220	8,029	
Sept.	4,074	3,832		3,096	3,980		11,326	7,859	

[1] Based on reports received from the Rubber Manufacturers Association.
[2] Held by manufacturers at end of period indicated.
* Revised.

Automobile Production

	United States Total	United States Passenger Cars	United States Trucks	Canada Total	Canada Passenger Cars	Canada Trucks	Grand Total
1928	4,357,384	3,826,613	530,771	242,382	196,737	45,645	4,599,944
1929	5,358,420	4,587,400	771,020	263,295	207,498	55,797	5,621,715
1930	3,355,986	2,814,452	540,534	154,192	125,442	28,750	3,510,178
1931	2,389,730	1,973,090	416,640	82,621	63,477	19,144	2,472,351
1932	1,370,678	1,135,493	235,187	60,816	50,718	10,098	1,431,494
1933*	1,920,057	1,573,512	346,545	65,924	53,855	12,069	1,992,126
1934*	2,753,111	2,177,919	575,192	116,852	92,647	24,205	2,869,963
1935*	3,946,934	3,252,244	694,690	172,877	135,562	37,315	4,119,811
1936*	4,454,115	3,669,528	784,587	162,159	128,369	33,790	4,616,274
1937*	4,808,974	3,915,889	893,085	207,463	153,046	54,417	5,016,437
1938	2,489,635	2,000,985	488,650	166,142	125,081	41,061	2,655,777
1939							
Jan.	339,152	280,033*	59,119*	14,794	11,404	3,390	353,946
Feb.	297,841	239,980*	57,861*	14,300	10,914	3,386	312,141
Mar.	371,940	299,703	72,237	17,549	12,689	4,860	389,489
Apr.	337,372	273,409	63,963	16,891	12,791	4,100	354,263
May	297,508	237,870	59,638	15,706	11,585	4,121	313,214
June	309,720	246,704	63,016	14,515	10,585	3,930	324,235
July	209,343	150,738	58,605	9,135	5,112	4,023	218,478
Aug.	.....	.....	.....	.....	.....	.....	.....
Sept.	.....	.....	.....	.....	.....	.....	.....

* Revised.
Note: U. S. figures represent factory sales; Canadian figures represent production.

Exports of Crude Rubber from Principal Producing Countries

(Long Tons)

	BRITISH MALAYA [1]							NETHERLAND INDIES [4]						
	Gross Exports	Imports	Net Exports	Ceylon [2]	India & Burma [2]	Sarawak [2]	British North Borneo [3]	Siam [3]	Java & Madura	Sumatra E. Coast	Other N. I.	Indo-China [3]	Amazon Valley	All Other [5]	World Total [6]
1923	252,016	70,432	181,584	39,971	6,416	5,705	4,237	1,718	32,930	46,344	57,822	5,067	16,765	7,856	406,415
1924	259,706	108,524	151,182	39,997	7,697	6,699	4,621	2,962	42,446	54,497	80,347	6,688	23,165	9,065	429,366
1925	316,825	158,022	158,803	49,566	10,082	5,424	5,377	5,377	46,757	65,499	120,626	7,881	25,298	13,797	514,487
1926	391,328	151,243	240,085	58,962	9,874	9,155	6,079	4,027	52,186	71,413	121,231	8,203	24,298	16,017	621,530
1927	371,322	182,845	188,477	55,356	11,321	10,923	6,582	5,472	55,297	77,815	142,171	8,645	28,782	15,633	606,474
1928	409,430	149,787	259,643	57,267	10,790	10,087	6,698	4,813	58,548	82,511	121,770	9,548	21,129	10,690	653,794
1929	574,836	163,092	411,744	81,584	11,663	11,077	7,381	5,018	65,990	87,789	134,037	9,696	21,148	6,767	853,894
1930	547,043	133,876	413,167	76,970	10,782	10,309	6,781	4,251	69,755	79,396	115,254	7,665	14,260	5,651	814,241
1931	519,740	125,506	394,234	61,769	8,470	10,451	6,247	4,218	75,952	87,747	116,009	11,696	12,121	3,292	792,203
1932	478,252	92,539	385,713	48,973	3,388	6,960	4,664	3,451	61,312	79,837	85,871	13,883	6,450	1,816	702,818
1933	573,412	167,377	406,035	63,351	4,527	10,874	7,555	7,765	73,851	91,861	149,659	18,394	9,883	2,737	846,312
1934	677,361	211,803	465,558	79,746	10,492	17,233	11,103	17,545	87,400	112,058	175,470	20,170	8,903	2,985	1,008,663
1935	590,319	174,652	415,667	54,316	13,968	19,465	8,885	28,327	57,488	78,325	139,297	28,816	11,275	8,745	864,574
1936	520,286	167,799	352,487	49,692	14,724	21,243	8,177	33,702	61,307	84,577	152,205	40,782	14,193	11,466	845,431
1937	681,638	213,446	468,192	70,353	17,015	25,922	13,213	5,551	84,085	139,632	207,863	43,399	15,576	13,063	1,133,864
1938	526,911	156,101	370,810	49,528	15,178	17,792	9,512	41,080	57,526	94,501	145,909	58,518	14,618	12,920	887,892
1938:															
Mar.	49,197	15,813	33,384	3,834	1,235	1,564	853	2,837	5,673	10,156	15,447	3,213	1,831	1,322	81,349
Apr.	53,864	9,158	44,706	1,951	1,327	1,728	1,158	1,583	5,967	10,081	12,434	3,647	1,004	774	86,360
May	38,245	10,325	27,920	2,833	1,470	1,648	815	2,507	4,575	7,515	9,944	3,118	1,053	904	64,302
June	42,258	14,394	27,864	3,693	1,318	2,441	643	3,904	4,519	7,788	12,120	4,776	718	818	70,602
July	43,689	18,713	24,976	3,861	1,083	2,057	937	4,710	6,808	8,271	19,955	5,139	625	1,063	79,485
Aug.	47,246	13,735	33,511	4,401	953	965	728	4,793	4,757	7,339	11,006	3,840	1,050	1,074	74,417
Sept.	40,992	10,586	30,406	3,990	1,036	756	284	3,893	4,026	7,052	9,092	8,139	758	1,292	70,724
Oct.	42,294	16,599	25,695	4,893	1,111	1,612	1,075	4,438	4,486	8,229	17,166	3,638	1,796	1,092	75,231
Nov.	39,340	10,219	29,121	6,422	1,271	929	567	3,223	3,975	5,678	9,568	4,035	1,159	990	66,938
Dec.	32,901	7,607	25,294	3,212	1,586	599	227	3,029	1,873	4,332	4,315	9,815	2,205	1,021	57,508
1939:															
Jan.	43,332	19,049	24,283	7,237	1,879	2,342	1,604	2,918	6,787	11,261	20,630	4,739	1,708	1,200*	86,588
Feb.	43,084	13,889	29,195	5,495	1,565	1,484	664	5,606	4,833	8,410	11,658	5,659	1,056	1,200*	76,825
Mar.	43,259	14,035	29,224	3,718	1,393	1,177	344	5,401	5,361	8,084	14,428	4,636	1,331	1,200*	76,297
Apr.	43,668	13,996	29,672	2,225	1,260	2,446	1,687	2,660	5,321	9,250	13,691	2,581	1,139	1,200*	73,132
May	42,214	12,697	29,517	2,807	1,678	1,649	558	2,782	4,105	8,159	12,009	4,585	874	1,200*	69,923
June	31,541	9,567	21,974	3,641	1,452	1,157	332	1,748	5,839	8,846	12,754	4,630	591	1,200*	64,164
July	45,962	20,052	25,910	4,908	1,291	3,092	1,603	5,599	7,556	11,462	16,525	3,367	600*	1,200*	83,113

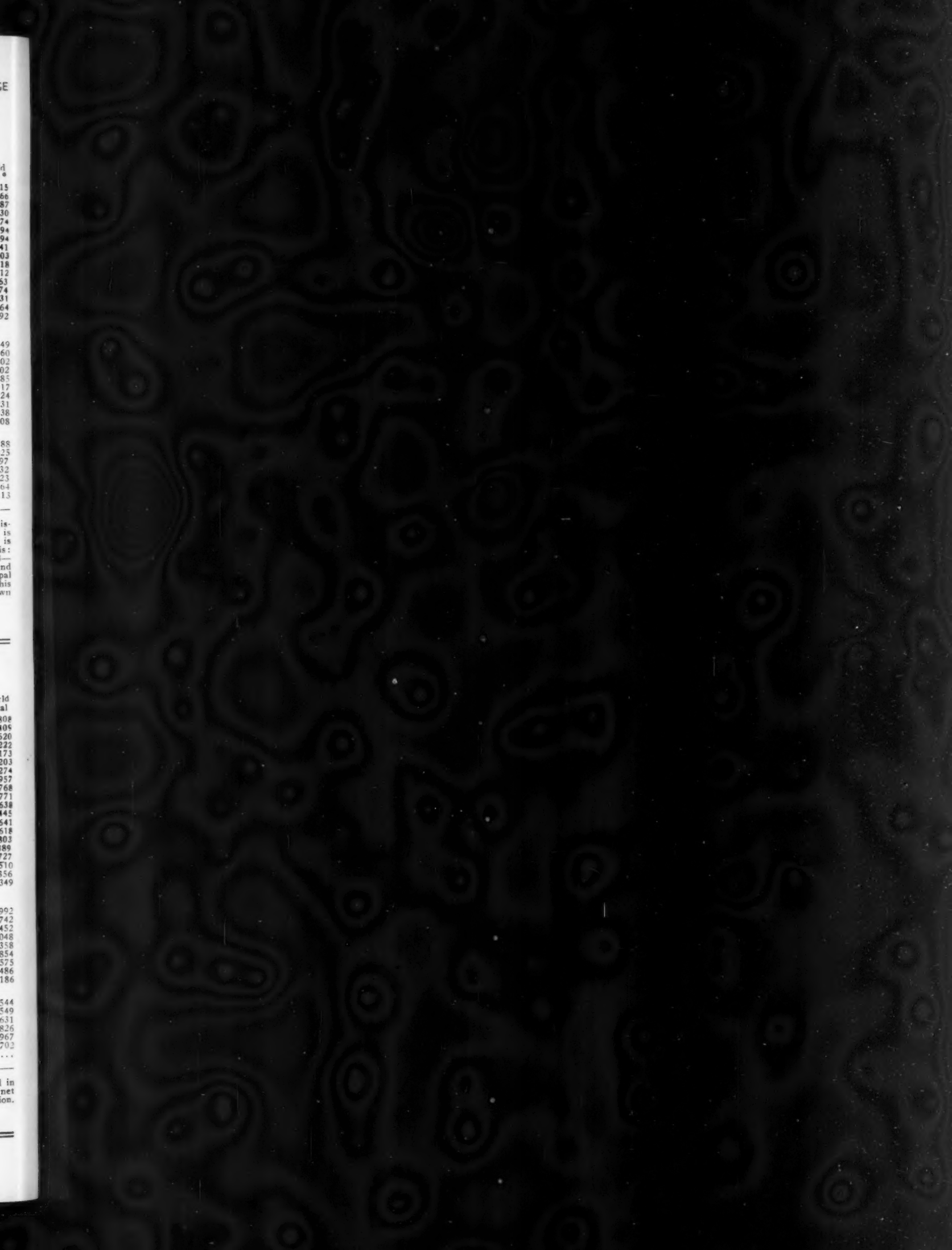
All figures from January, 1934, onward are net exports shown on a "dry rubber" basis as calculated by the International Rubber Regulation Committee. (1) Prior to January, 1934, Malayan net exports cannot be taken as production, since imported rubber is largely wet native rubber, which is reduced about one-third in weight by remilling; rubber exported as latex also is not included in the early years, which on a dry rubber basis was as follows: 1924—1,117 tons; 1925—3,618; 1926—3,263; 1927—2,439; 1928—2,247; 1929—3,574; 1930—2,750; 1931—1,940; 1932—5,193; 1933—10,470, and 1934—14,172 tons. (2) Ceylon Chamber of Commerce statistics until 1926; rubber exported as latex is not included—such shipments on a dry rubber basis were: 1923—18 tons; 1924—90; 1925—6; 1926—20; 1927—½; 1928—1; 1929—2; 1930—11; 1931—2; 1932—2; 1933—1, and 1934—6 tons. (3) Official statistics. (4) Exports from "Other N. I." are chiefly wet native rubber, which is reduced about one-third in weight by remilling; rubber exported as latex is not included in earlier years, which is as follows on a dry rubber basis: 1923—2,342 tons; 1924—1,008; 1925—2,239; 1926—44; 1927—84; 1928—1,395; 1929—437; 1930—2,744; 1931—3,874; 1932—3,488; 1933—5,260, and 1934—5,330 tons. (5) Calculated from official import statistics of principal consuming countries; also includes United States imports of guayule. (6) This total includes the third column for British Malaya and all other figures shown for other territories. (*) Figure is provisional.

NOTE: ANNUAL FIGURES ARE MORE ACCURATE; THEY ARE REVISED AT THE END OF THE FOLLOWING YEAR.

Net Imports of Crude Rubber into Principal Manufacturing Countries

(Long Tons)

	United States [1]	United Kingdom	France (h)	Germany	Canada (ac)	Japan (da)	Italy	Russia (ce)	Australia (cd)	Belgium (d)	Netherlands	Scandinavia (abcdf)	Spain (g)	Czechoslovakia (abcd)	World Total
1919	238,407	42,671	17,685	5,584	6,395	9,753	9,894	75	1,002	3,995	2,771	3,149	2,418	9	343,808
1920	249,530	56,844	13,885	11,890	11,746	5,297	6,123	62	1,815	3,840	5,510	2,292	2,008	567	371,408
1921	179,736	42,087	15,135	21,920	8,124	21,713	3,906	165	1,014	1,705	1,022	1,279	2,245	569	300,620
1922	296,594	11,724	24,352	27,546	9,207	15,934	6,430	2,493	2,643	172	—3,807	1,778	589	567	396,222
1923	301,527	12,700	27,392	18,519	13,277	15,372	8,489	2,986	1,649	2,184	792	2,528	630	1,128	409,173
1924	319,103	—11,550	30,446	22,727	14,299	19,571	8,764	2,346	3,124	2,688	—807	3,178	944	1,370	416,203
1925	385,596	4,061	32,956	33,937	19,683	11,117	11,412	7,088	4,757	2,930	875	3,149	1,155	1,558	520,274
1926	399,981	84,865	34,240	22,775	20,229	18,125	9,809	6,529	9,021	2,498	2,670	4,046	1,299	1,870	617,957
1927	403,472	60,249	34,271	38,892	26,405	20,521	11,381	12,018	9,490	6,482	636	4,224	2,055	2,672	632,768
1928	407,572	4,846	36,498	37,855	30,447	25,621	12,433	15,134	8,430	7,958	2,243	4,418	3,178	3,138	599,771
1929	528,608	122,675	55,093	49,275	35,453	34,284	17,169	11,774	15,886	9,445	3,022	6,440	864	4,650	894,638
1930	458,036	120,069	68,503	45,488	28,793	33,039	18,639	16,387	5,354	10,635	2,924	7,710	2,400	4,468	822,445
1931	475,993	86,170	46,466	39,688	25,261	43,483	10,149	30,671	7,649	11,009	2,220	6,360	2,605	7,717	794,641
1932	393,844	44,086	42,506	45,121	20,917	56,027	14,469	30,637	12,576	9,519	2,851	7,262	4,359	9,444	693,618
1933	398,365	73,335	61,953	54,120	19,332	66,831	19,341	29,830	13,534	11,166	1,243	7,831	5,520	10,402	772,803
1934	439,172	158,482	49,560	59,330	28,439	69,905	21,398	47,271	9,642	9,115	3,758	12,418	6,900	10,999	926,389
1935	455,758	128,829	51,450	62,899	26,870	57,567	21,880	37,572	9,978	7,593	4,068	11,878	8,140	11,245	895,727
1936	475,359	—2,591	57,032	71,794	27,871	61,223	16,534	30,967	14,109	9,648	2,888	11,236	6,668	8,772	791,510
1937	592,394	92,707	59,871	98,170	36,088	62,311	24,733	30,462	19,164	14,970	4,343	4,680	2,400	13,663	1,055,356
1938	406,343	133,079	59,660	90,200	25,696	45,836	28,170	25,650	11,944	11,309	5,092	16,034	2,400	9,936	871,349
1938:															
Apr.	31,870	14,653	5,757	6,497	999	5,454	2,397	4,281	640	904	449	971	200*	920	75,992
May	27,809	14,675	5,169	9,595	2,545	3,327	2,422	4,163	1,041	1,137	419	1,283	200*	957	74,742
June	26,429	14,053	4,542	7,478	3,243	2,145	2,399	505	805	853	663	1,149	200*	988	65,452
July	22,209	12,678	5,433	6,927	2,685	3,099	3,641	541	1,215	1,106	528	1,151	200*	635	62,048
Aug.	31,494	12,891	3,662	7,190	1,832	2,033	2,078	739	1,182	1,238	259	965	200*	595	66,358
Sept.	34,436	8,100	5,094	7,390	1,405	3,584	1,799	1,725	1,779	519	385	1,830	200*	608	68,854
Oct.	33,830	3,085	3,791	6,326	3,139	3,204	3,921	2,000*	1,780	848	420	3,022	200*	9	65,575
Nov.	32,567	936	5,322	7,275	3,123	4,665	1,984	4,000*	660	636	530	1,209	200*	379	63,486
Dec.	37,051	4,134	5,820	7,481	2,198	4,000	2,355	2,500*	647	876	263	1,013	200*	648	69,186
1939:															
Jan.	36,614	836	4,684	7,227	2,867	2,553	2,133	4,000*	910	898	454	1,037	200*	1,131	65,544
Feb.	30,578	4,773	5,315	7,569	1,451	3,263	2,025	2,000*	1,741	1,068	184	858	200*	524	61,549
Mar.	45,286	8,082	4,503	8,036	2,458	4,019	1,525	2,000*	1,316	1,242	368	1,133	200*	463	80,631
Apr.	31,590	4,752	5,639	8,719	1,466	3,579	1,926	2,000*	1,108	855	333	1,062	200*	597	63,826
May	45,390	7,531	4,646	8,413	3,006	4,438	1,573	2,000*	1,188	792	518	1,654	200*	618	81,967
June	33,951	8,439	4,649	8,190	2,423	3,067	1,992	2,000*	1,308	621	672	2,703	200*	487	70,702
July	36,932	4,040	4,282	8,437	.....	.....	.....	.....	.....	.....	565	.....	.....	.....	.....

a—Including gutta percha. b—Including balata. c—Re-exports not deducted in monthly statistics. d—Including some scrap and reclaimed rubber. e—Official statistics of rubber imports by Soviet Russia. f—Including Norway, Sweden, Denmark and Finland. g—United Kingdom and French exports to Spain except in years prior to 1925. h—French imports have been reduced in order to eliminate imports of gutta percha and to reduce to basis of net weight. [1]—United States imports of guayule are included in this compilation. *—Figure is provisional; final figure will be shown when available.

NOTE: ANNUAL FIGURES ARE MORE ACCURATE: THEY ARE REVISED AT THE END OF THE FOLLOWING YEAR.